CHEM. LIBRARY
MAR 25 1921
CHEMICAL LIBRARY


# GAS JOURNAL

## LIGHT ✦ HEAT ✦ POWER ✦ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

VOL. CLIII. No. 3017.] LONDON, MARCH 9, 1921. [73RD YEAR. PRICE 1s.



**OXIDE OF IRON**
**SPENT OXIDE**

GAS PURIFICATION AND CHEMICAL CO., Ltd.
PALMERSTON HOUSE, LONDON, E.C.2.
*Telegrams:* "PURIFICATION, LONDON."
*Telephone:* 9144 LONDON WALL.

**PUMPING ENGINES**
*All Types for ACID, &c.*
CAST-IRON OR STEEL TANKS
*Any Capacity.*
CHEMICAL PLANT.
Roofs and Girders. Structural Work.
Air and Gas Compressors.
MIXERS.
TAR STILLS AND CONDENSERS.
SULPHATE OF AMMONIA PLANT
W. NEILL & SON, LD.
Engineers, Iron & Brass Founders,
ST. HELENS JUNCTION.
Telegrams: 'NEILL, ST. HELENS.' Telephone No. 20.

**PURIFYING MATERIAL**
"Brownox-de-Luxe."
Unqualified Satisfaction given where used.
SPENT OXIDE PURCHASED
J. BROWN & CO., Ltd.
Savile Town, DEWSBURY.

**TORBAY JOINT STOPPING**
FREE FROM LEAD.
The TORBAY PAINT CO.,
26/28, Billiter St., LONDON, E.C.
39/41, Old Hall St., LIVERPOOL.

**"BLUEBELL" SILICA RETORTS**
(95% SILICA)
John G. Stein & Co., Ltd.,
*Castlecary, SCOTLAND.*

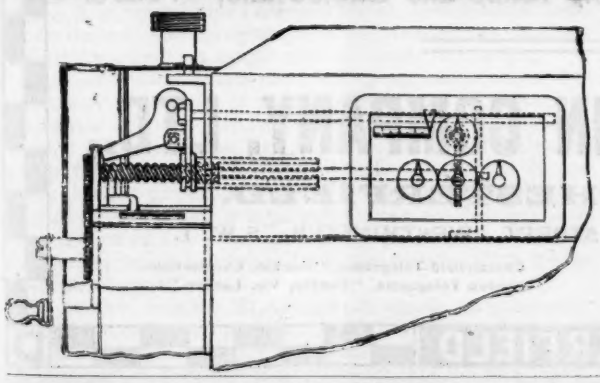
Makers of
GASHOLDERS,
TANKS (C.I. or Steel),
PURIFIERS,
WASHERS,
ROOFS,
&c.
ASHMORE, BENSON, PEASE & CO., LTD., STOCKTON-ON-TEES.
Complete GAS WORKS
London Office:
32, Victoria Street, Westminster, S.W.
Telegrams: "GASHOLDER."

**W. & B. COWAN**
(Incorporated in Parkinson and W. & B. Cowan, Ltd.).
LONDON. MANCHESTER. EDINBURGH. GLASGOW.
SYDNEY. MELBOURNE. BRISBANE. WELLINGTON, N.Z.
(See Advertisement on page iii. of Wrapper.)

**JAMES McKELVIE & CO.**
Coal Owners,
Gas and Steam Coal Contractors,
17, RUTLAND SQUARE, EDINBURGH.
59, MARK LANE, LONDON, E.C.
GUILDHALL CHAMBERS, SANDHILL, NEWCASTLE-ON-TYNE.
24, CHAPEL STREET, LIVERPOOL.
ESTABLISHED 1840.

**STEWARTS AND LLOYDS, LIMITED,** 41, OSWALD STREET, GLASGOW. BROAD STREET CHAMBERS, BIRMINGHAM.
**TUBES & FITTINGS for Gas, Steam, Water, &c.**

**GEORGE GLOVER & CO., LTD.,**
*CHELSEA.*



"THE STANDARD"
**SLOT METER.**
For Pennies, Shillings, Half-Crowns, or any other coin.
All parts standardised and interchangeable. No spring of any kind in pre-payment mechanism.
Can be fitted with **STRONG BOX,** if desired, or with **"M & M" LOCK.**

**LONDON**: *RANELAGH WORKS, ROYAL AVENUE, CHELSEA, S.W.3.*
*TELEPHONE: 1140 Kensington.*
*WIRE: "Dry Meters, 'Phone, London."*

LEEDS *9, DEWSBURY ROAD.*
*TELEPHONE: No. 26463.*
*WIRE: "Meters, Leeds."*

MANCHESTER:
*GAYTHORN METER WORKS, EASTON STREET.*
*'PHONE: No. 6898 City. WIRE: "Slot, Manchester."*

SOLE MAKERS OF THE
H. & J. DENNIS, LTD., 34, VICTORIA STREET, S.W. 1. MANCHESTER.
& COAL WASHER.
PERMUDUK ELASTIC PAINT
Does not blister or "chalk" off.
HENRY BROADBENT & CO., LTD. HUDDERSFIELD, LONDON, S.E. 16.

# A GREAT BRITISH INDUSTRY

THE SECRET OF THE UNDOUBTED SUPERIORITY OF WELSBACH GAS MANTLES LIES IN THE FACT THAT FOR OVER 32 YEARS THE MOST EXPERT CHEMISTS HAVE CONCENTRATED ON THE VITAL POINTS WHICH GO TO COMBINE STRENGTH WITH BRILLIANCY

THE MATERIALS USED ARE THE FINEST QUALITY PROCURABLE AND CONSTANT CARE IS EXERCISED TO SEE THAT THE QUALITY IS NEVER ALLOWED TO GO BELOW THE HIGHEST STANDARD

# WELSBACH
BRITISH MADE
## GAS MANTLES

*There are no better Mantles made*

USE A SMALL BURNER WHERE A SMALL LIGHT WILL DO AND SO SAVE GAS

BRITISH MADE

THE IDEAL BURNER FOR SMALL ROOMS SUCH AS BATHROOM, SCULLERY, ETC., WHERE ONLY A SMALL LIGHT IS NECESSARY

THE
# WELSBACH
## ECONOMY BURNER

*Prices and particulars upon application*

*ADVT. OF THE WELSBACH LIGHT CO., LD., WELSBACH HOUSE, KING'S CROSS, LONDON, W.C. 1.*

B DONKIN D

# DONKIN
for
# GAS VALVES
## SINGLE AND DOUBLE FACED.

EXHAUSTERS, COMPRESSORS, RATEAU TURBO GAS EXHAUSTERS, PUMPS.

# THE BRYAN DONKIN COMPANY, LTD.,

Head Offices & Works, **CHESTERFIELD.**

LONDON OFFICE: 3, VICTORIA STREET, WESTMINSTER, S.W. 1.

Chesterfield Telephone No. 84.
London Telephone No. 5358 Victoria.

Chesterfield Telegrams, "Donkin, Chesterfield."
London Telegrams, "Donkin, Vic. London."

B CHESTERFIELD D

# GAS JOURNAL

**LIGHT ⁘ HEAT ⁘ POWER ⁘ BYE-PRODUCTS**

[Founded in 1849 as the "Journal of Gas Lighting."]

EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

VOL. CLIII., No. 3017.] WEDNESDAY, MARCH 9, 1921. [73RD YEAR.


## EDITORIAL NOTES.

### The Testing Clauses in the Act—A Criticism.

THE first critical examination of the testing clauses in the Gas Regulation Act by one very competent to make such an examination will be found in this week's contribution to our series of Special Articles on the Heat-Unit Basis. It is by Mr. J. F. Simmance, Assoc.M.Inst.C.E., than whom no one has done more constructive work in devising and perfecting testing instruments necessary to the work of the gas industry. However, with all that has been done in this regard, official testing, distinct from individual enterprise and care, has been at the best carried on under comparatively crude conditions; but it is hoped that the provisions of the Gas Regulation Act will make a vast difference in this respect, to the advantage both of the gas undertakings themselves and of the consumers. Anything that tends to the satisfaction of the latter must redound to the benefit of the former. It is mainly with the terms of the testing provisions, and not with their intentions, that Mr. Simmance is dissatisfied; and we think that in a large measure competent gas men in the industry will be prepared to go with him, though the criticism is made before there has been any experience of the working of the Act, which may (events have to decide) allay any fears that may be engendered by the criticism.

The first point to which our contributor directs attention is the large powers entrusted to the Gas Referees, with only an appeal from them to another official—the Chief Gas Examiner—appointed by the same Government Department. He does not make any personal reflections. Indeed, were the present Gas Referees assured of perpetual life and official tenure of office, all would be well; but Acts of Parliament are made (unless revoked or amended) to govern matters permanently, while men and their ideas come and go. So the extensive powers conferred on the Referees may not always be in such good hands as now. No one can tell; and therefore the danger of the large powers lies in the want of adequate protection for the industry should it ever be required. Mr. Simmance does not suggest the form of protection that he would favour. But he proceeds to illustrate where failure may arise. He thinks that it will require a great deal of persuasion to get an official colleague appointed by the same Department to render void anything done by the Gas Referees. Then, again, if it is desired to appeal against any prescription of the Referees, only a month is allowed by the Act for doing so. With the insufficiency of this period most men experienced in gas testing will agree. Our contributor's competence in these matters cannot be denied; and his criticism of the month may be summed up by quoting a single sentence from his article: "I "have never come across any piece of apparatus about the "accuracy or stability of which I could come to a decision "within a month." If this sentence expresses the views of other competent men, and we think it will, then the inadequacy of the month will be confirmed. Though it is not likely that the present Referees will take any undue advantage of the Act when it is palpable there are just grounds for a review of any prescription, as a permanent condition six months would be preferable to one month within which to lodge an appeal.

In another matter, Mr. Simmance treads on somewhat delicate ground; but he does not shirk it. He is known in the gas industry as not only scientifically skilled in the matter of calorimeters and other testing instruments, but as a manufacturer. Those who know him best are fully aware that scientific interest in the cause of perfection in operation rises superior to trading interest; and when he says that some of the apparatus that has been prescribed by the Gas Referees has been by no means the last word in perfection, we may be sure that he is not saying something that he is not prepared to defend. Though that accusation may be correct, it does not follow that what has been will be. And, moreover, it will be open to the user to appeal against any prescribed instrument if it does not fulfil satisfactorily its destined functions. This point supplies an additional reason why the month in which appeal may be made should be extended to a period in which a thorough test of prescriptions or types of apparatus may be made. At the same time, the Referees are not proceeding hastily. As is well known, they are taking time to observe with care under working conditions the performances of recording calorimeters before making final determination. However, we see that Prof. C. V. Boys, who is one of the Gas Referees, has, jointly with the Board of Trade, lodged an application for a patent for a recording and integrating gas calorimeter, which may prove the best of the kind that has ever been invented. No one outside the office of the Gas Referees can at present say anything as to this; but, being the invention of one of the Referees, it would give a great deal of satisfaction if, independent of the observations of the Referees themselves, arrangements were made for a disinterested body —say the Board of Fuel Research, or the Leeds University Gas and Fuel Department—to subject the instrument to comparative tests with other instruments on the market, before (if it is the instrument it is contemplated to prescribe) it is actually prescribed. We say this (as Prof. Boys will readily understand) not with any idea of questioning the resulting precision of his instrument—it would be an impossibility at the present time—but so that the gas industry shall proceed with confidence well established in the instrument, if it be the one that the Referees finally determine upon.

Passing from this, Mr. Simmance points to the alternative possibilities which the Act opens up to the prescription of different instruments for different undertakings of dissimilar magnitude. This has been done, we believe, on the ground of expense in the case of the smaller undertakings. But our contributor appears to be rather inclined to the view that for those gas undertakings that come under the Act there should be co-ordination of testing. There can be no ground for any variation other than that of expense, seeing that by the Act competent examiners are assured, which is a point that meets with the approval of our contributor. Then, again, there is need for care with recording calorimeters, as well as for checking them. Although Mr. Simmance has made (after much patient study and work, and almost disheartening disappointments) an instrument that may be relied upon, within the limits of variations met with in any undertaking, as being accurate within $1\frac{1}{2}$ p.ct. of the total heat value of the gas, he warns against accepting any instrument as being without correction unerring under all conditions. There must be laboratory or other check tests. Another point is the difficulty of reconciling momentary calorimetric tests in the laboratory, with the average calorific value as found by the recording calorimeter over a quarter year. But in the end he states what he considers would be satisfactory prescriptions. If his anticipations in this respect are not justified by events, then he is of opinion that the industry will have to consider its position very seriously. We have now to await developments, which will be examined closely in the light of the criticism and warnings that are contained in this week's special article.

## Combustibles and Incombustibles in Relation to Gas Utilization.

In our editorial columns a fortnight ago, attention was called to a paper by Prof. R. V. Wheeler, of the Sheffield University, in which he showed the superior value of carbon monoxide over hydrogen in gas used for furnace purposes. He has since delivered a lecture before the Sheffield Gas Consumers' Association, on "The Composition of Gas in "Relation to Utilization." It indirectly indicates that it is a great pity the evidence that representatives of the Association gave before the Board of Trade Committee on Inerts had not been chastened and modified by more definite and scientific information. It would have made a considerable difference to the weight of the evidence; and, instead of its being of a ragged, inconclusive, and generally unsatisfactory character, it would at all events have been less dogmatic, better fashioned, and so of more presentable appearance. The text of Prof. Wheeler's lecture is reproduced in other columns. The lecture is designed to show two things: The limits within which variations in the proportion of combustible constituents affect the behaviour of coal gas on burning; and what is the effect of the incombustible constituents. The latter is one of the points that the Gas Investigation Committee are ascertaining by investigation under actual conditions of use. Prof. Wheeler draws his conclusions from known scientific facts.

In relation to the first part of the inquiry, the lecturer makes his deductions from the knowledge available as to the behaviour of individual gases, and adopts as standard conditions those which are necessary to realize the maximum calorific effect with the bunsen burner. All his arguments are based upon the speed of the propagation of flame in the mixture of gas and air issuing from the burner head, which propagation of flame, of course, varies with the composition of the mixture and the nature of the combustible gases. Naturally the speed of propagation of flame that issues at the burner head determines the character of the flame. If the flame travels through the mixture at a faster speed than that at which the current of mixture is passing, the flame will strike-back into the burner. These are quite elementary points to students of flame. They are not to the Sheffield Gas Consumers' Association, nor (we are afraid) to a good many of our own readers. The facts therefore require circulation and emphasis, because they have a considerable bearing upon the final results of our practices. For this reason, and in view of the two inquiries that are proceeding, the lecture is opportune and valuable, although facts of the kind do not give much scope for comment.

However, what has been said indicates the line upon which Prof. Wheeler has proceeded in arriving first at the conclusion that there should be no limitation of combustibles in gas—if there was to be any limitation at all from the aspect of utilization, it would be preferable that it should be upon the hydrogen, because there is a disadvantage in having hydrogen in too high a proportion. But, of course, in all these things, the producers of gas are not entirely masters of the situation. They are tied by the materials from which they have to produce, and by the conditions of production, as well as by economic considerations. However, the Committee on Carbon Monoxide will probably take cognizance not only of the facts published on p. 460 of our issue of Feb. 23, but of the further ones contained in the present lecture. For example, the addition of carbon monoxide to methane and hydrogen has little effect on the speed of propagation of flame; but it widens the range of inflammability, and therefore gives greater adaptability to the gas. Also that, in general, a mixture containing carbon monoxide, methane, and hydrogen in equal proportions is that which is most suitable for all bunsen burner work. But there comes in the question of what is and what is not practicable. Equal proportions of the three gases are unattainable; but what the advocates of restriction and the obstructionists to the progress of the gas industry are after is to put a limit to one of the valuable constituents of gas, and so increase one which is less valuable from the calorific intensity point of view. This bears upon another matter. Prof. Wheeler considers the effect of mingling water gas with straight coal gas to ascertain how far additions can be made without serious difficulties arising in the utilization of the mixture. We know that the greater the amount of primary aëration that can be obtained (without the flame striking-back), the greater is the calorific intensity of the flame; and the greater the amount of primary air, the smaller the required secondary air to effect complete combustion. Assuming a constant speed of the mixture at the burner of 150 cm. per second, the lecturer shows that with a straight coal gas only 1½ p.ct. of gas requires burning by secondary air; with water gas, 16 p.ct. must be so burned. But he points out that there can be no disadvantage in the use of any of the gases for purely heating purposes, providing the burner is sufficiently adaptable, and the pressure of either gas or air or both can be controlled. Assuming the latter adjustment to be impossible, and the apparatus to have been designed for straight coal gas, Prof. Wheeler says 50 p.ct. of coal gas and 50 p.ct. of water gas will represent about the limit of addition of water gas, and this is a very serviceable gas, despite the low calorific power. In short, he finds no reason for trying to place limits on the proportions of the combustible gases present in town gas; and "combustible "gases" include carbon monoxide.

Regarding incombustibles, here again Prof. Wheeler finds, as others have found—not empirically, but scientifically—that the calorific efficiency of a fully aërated mixture is not affected very much by even the proportion of 30 p.ct. of incombustibles in the gas. That is what the Gas Investigation Committee's researches have disclosed. In the case of gas-fires and boiling-rings, even higher percentages have been found not to have any detrimental effect upon thermal efficiency, though the incandescent burner shows a little sensitiveness when the incombustibles rise above 30 p.ct. What the incombustibles do is to reduce the margin of adjustability; and this means that "slight variations in "pressure will cause wide fluctuations in the character of "the flame, and in the distribution of heat throughout it, "with consequent inefficiency of the furnace." The Gas Investigation Committee have not yet explored the question of the thermal efficiency of different gas-furnaces with gases of varying composition, and therefore containing different proportions of inerts. But their findings with bunsen burners show that, over the range of applications so far investigated, efficiency is not affected much by inerts, other than in the case of the incandescent burner, and then fairly comparable results are obtained (as previously said) up to and rather exceeding 30 p.ct. of inerts, providing adjustment is attended to, and the burners are made capable of passing an equal quantity of heat units. It is admitted that with some types of furnaces an excessive amount of inerts is not conducive to the highest efficiency; but there are furnaces and furnaces. And the experience of representative manufacturers who are members of the Sheffield Gas Consumers' Association is that with the regenerative form of furnace producer gas is used with good efficiency.

The lecture by Prof. Wheeler is a valuable one; and we should like to emphasize the acknowledgment which he makes that his deductions have been rendered possible through the researches of Mr. W. Payman, M.Sc., who is the research student in the Department of Fuel Technology of the Sheffield University.

## Exploration of a Gas Undertaking for Higher Economy and Efficiency.

It is not often that Mr. James Paterson, of Cheltenham, takes pen in hand, and lays bare his views upon current topics, technical and commercial, that especially concern the gas industry. When he does, he is always interesting, and manages to direct thoughts into new grooves. This is the case with the address which he delivered from the Presidential chair of the Midland Association of Gas Engineers and Managers last week, one of the predecessors in which chair was his distinguished father, who did so much quietly and unobtrusively to raise the standard of efficiency in the gas industry. But what a difference between the conditions in the industry that prevailed when Mr. R. O. Paterson was President, and those that now obtain! Cheltenham was then a place to which gas men made pilgrimages to learn the secret of high makes, high candle power, and low prices. That was in the long period before practically all town gas was bunsenized in use. The son succeeds the father; and custom and application in regard to gas, as in other things, undergo change. The things that were of good report in the father's professional days are in the main respects obsolete to-day. New considerations have arisen; and the old balance of things no longer exists. There has to be readjustment to new requirement, functions, and conditions. But before there can be this in fulness, there should in every gas undertaking be a searching exploration from the

foundations upwards and outwards—through capital, plant, processes, and practices—to ascertain what alterations or transformations are requisite to produce the greatest economy and efficiency, working under the new order of things in respect of circumstances and requirement. In his address first place is given to this by Mr. Paterson. There are two compelling causes—the issues of war and the Gas Regulation Act. The three main directions in which thorough investigation is desirable (the minor ones are also important, as nothing should be passed in which there is some contributory scope for the improvement of economy and efficiency) are capital, labour, and manufacturing operations, with the view to the production and sale of heat units at the lowest possible cost.

The war has left us with a state of things in which the ratio of capital to production or sale will for all replacement or extension work be on a higher level than in the past; and for a long time ahead capital will be dearer, as witness current offers of redeemable preference and debenture stock at 8 p.ct. However, we cannot have extensions of business without capital expenditure and the raising of money, and replacements cannot be effected without adopting, in the quest of economy and higher efficiency, plant of a different order. This condition, of course, necessitates that the most productive plant and processes shall be utilized; but this means a heavy cost. Apart from this, the President calls attention to another matter affecting capital. He advises an analysis of the capital expenditure of every gas company, as this may often show how the gradual growth of an undertaking has rendered part of the capital outlay of no present earning capacity. It is no use having a millstone of this kind permanently about one's neck; and so gas managers studying the interests of their concerns will mark a point to which Mr. Paterson calls attention, but which has not hitherto received much emphasis. That is the enabling power, under the section of the Gas Regulation Act dealing with Special Orders, to purchase or redeem and cancel obsolete or unproductive capital, or capital not represented by available assets. The advantage of this to an undertaking and to the consumers should need no argument at any time, and less now that the ratio of capital charges to production will undergo a change, and (this unavoidably) not for the better.

Regarding labour, the costs have gone up to an unprecedented level, until, as the Chairman of the Commercial Gas Company was pointing out the other day, the labour costs in that concern exceed the total cost of making gas in 1913. This is a serious condition of things for a public utility undertaking, and an undertaking subject to so much competition from other light and fuel sources. Labour costs have got to come down; and Mr. Paterson indicates two ways. One is by increasing production per man through the adoption, as occasion allows, of plant and processes that will enable this to be done, and by installing more mechanical aids to labour-saving. The wages paid for some manual services to-day represent an amount more than equal to the capital and maintenance charges on labour-displacing plant, which is not subject to trade union rates and edicts. So the position of manual labour in relation to mechanical work has depreciated. We are sorry in some respects; but necessity compels attention to these matters. It does not follow that changes in this direction will lower the total employment capacity of the industry. It is more than probable that it will not, because the lower the cost of production, the greater the business that will be done, and therefore the more the employment that will be provided, and this in the less arduous parts. This is one of the economic developments which the ultraists in the trade unions will not acknowledge, or have not the mental capacity to appreciate. They talk volubly and inanely of shortened hours to increase employment; but they do not recognize the limitations of purchasing power that the consequent increased costs of production bring into repressing operation.

Then comes the question of the production of heat units, and the lowering of costs under the new conditions, by the introduction, as opportunity allows, of new plant and processes. Those who are already well equipped in this respect are fortunate; those whose producing plant is of the old order, which only allows of light charges, a very moderate application of machinery, and heavy labour costs, will, even with the initially more expensive plant of these times, be able to effect economies well worth having. The President does not disclose what his own views are as to the character of plant upon which he would, when occasion permits, fix his choice to achieve the desired ends. But it is clear that he looks for further development in our knowledge of heat-unit production per ton of coal treated. All gas engineers who have given close study to the developments that have already taken place will only hazard opinions as to what may be, and refrain from definite prediction. However, as Mr. Paterson remarks, the development of gas manufacture is clearly a physico-chemical problem; and he adds that the question has to-day a better chance of solution by serious experiment and investigation than was possible during the last century, when empirical methods were practically the only tools in the hands of most gas engineers. It is quite true that our knowledge of gas-producing processes was not so advanced last century as it is to-day; but "serious experiment and "investigation" would have been just as "possible" then as now, had it not been that blindness, self-satisfaction, and want of vision were characteristics of our industrial procedure. This was not recognized then; but it is now, and this is due to revelations of science during the last few years. The industry and the community have been heavy losers by the old policy of taking things for granted; and the moral of this is that the responsible men in all gas undertakings should not be contented until they have completely explored every main part and branch of their working to ascertain that, in their particular circumstances, the highest economy and efficiency are being attained. But as to the future of carbonization, Mr. Paterson has been attracted by the 1918 "William Young Memorial Lecture" which Prof. Cobb delivered, and in which he established the all-important effect of gaseous atmosphere upon the process of carbonization. However, gas supply has to go on, despite anticipations as to future development. The best that can be done in the present is to adopt those systems already existent which point to the highest economy and efficiency in the production of those things the markets for which show most stability; and the chief of these are heat units in the form of gas.

There are many other directions in which economy can be sought besides the three main ones to which attention has been given. The President illustrates some. He also accentuates the importance of looking after consumers' appliances, for which service, though indirectly, the consumers pay. The attention promotes satisfaction; and satisfaction in this case is one of the outstanding constituents of business stability. Under the Gas Regulation Act, more will have to be done along this line. The adjustment of appliances is made a statutory obligation. We do not think that the question of the day-load factor need trouble engineers of gas undertakings much. The only interest in knowing the ratio of the average day load to the maximum day load is that it enables comparisons to be made as to how things are going generally in relation to consumption. At the same time the average is the product of such wide divergencies in demand during certain days that the value of the ratio is largely vitiated. What is more important is to do all possible towards levelling-up the valleys in the twenty-four hours' demand curve, so as to make as productive as possible the capital invested between the holders and the consumers' meters; also to work to reduce the gulf between the maximum winter day and the minimum summer day. This work has been going on; but the heating load in winter bids fair to defy all our best efforts to fill the valleys in the curves of seasonal demand. This cannot be helped, and thus is not to be avoided. It is the destiny of the industry; and therefore there must be called to its aid more and more those processes that will cheaply and promptly produce gas, with the lowest possible capital charge hanging upon them. Among the miscellaneous points in the address is one as to the drop in calorific power in the process of distribution. This has time and again been shown to be a negligible quantity, and less now than formerly when high illuminating power gas was distributed. Past references to the matter are not easily traceable. They are embedded among much else—in addresses, papers, and discussions, and (we seem to recollect) parliamentary proceedings. While not himself accepting it as accurate, Mr. Paterson speaks of a drop of 2 p.ct. in traversing a distance of a mile. Some interesting results of tests were given from an American source in our issue for April 13, 1915. There gas of high calorific power —upwards of 600 B.Th.U.—showed a loss of only 0·52 p.ct. in an eight miles travel.

The address is highly suggestive; and we see reflected in it the thoughtfulness and the penetration of one whose name was revered in the gas profession, whose work was ad-

mired for its independence, and was for the period justified by results, and who for so long was one of the strong men of the Midland Association.

## A Coal Crisis and Coal Prices.

It is difficult to gauge exactly the position in which the country stands in relation to the coal industry. The newspapers tell us we are approaching another coal crisis, principally over wages. On behalf of the coalowners, it is said that there is sufficient common sense among them and the miners to arrive at a satisfactory settlement; from a representative of the Miners' Federation, we hear that miners' wages must be maintained. The country knows full well that miners' wages, representing 80 p.ct. of the cost of production, must come down if the price of coal is to be reduced, and the coal industry is to be restored to a healthy condition. The country knows, too, that it is in the paradoxical position of having large stocks of coal above ground waiting for buyers, but that it cannot be sold below the fixed pithead prices without dead loss, because 80 p.ct. of the cost of its production is due to the extraordinarily high rate of wages already paid. Until there is a fair adjustment of the rates of pay to work done, the law of supply and demand will not operate in the regulation of coal prices, the lowering of which is so urgently needed by industry. At the same time, neither the coal owners nor the miners are desirous of seeing financial control taken off before Aug. 31—the date fixed by the Coal Mines Emergency Act; while the Government are equally resolved that the consent of Parliament shall be obtained to financial control being discontinued at the end of this month. The owners regard this as inopportune, owing to the disastrous collapse of trade and the steep drop in the demand for coal both at home and overseas; and the miners do not want it until a new basis of wages is settled. There the two parties are agreed, though viewing the matter from different standpoints.

By March 31, the owners and the miners will have had over three months in which to prepare, under the terms of the coal strike settlement, a scheme of wages for submission to the Government; but at the present moment, there appears to be little hope of effecting this, although the owners are optimistic of eventually reaching a basis on which a scheme can be constructed, though whether by March 31 is somewhat doubtful. The brightest spot in the position is that the two parties have arrived at agreement on certain principles; and these form a framework which requires filling-in by details. The darkest spot has relation to the details; and it is upon them that collapse may take place. For example, the Miners' Federation desire wages to continue being dealt with on a national basis; the owners declared their intention of dealing with the question only on a district basis. The miners point out that the result of this would be that the poorer coal districts would have the biggest wage reductions; and the richer ones the smaller reductions. From both sides, the position could be argued from several points of view; but this is not the place for such an exercise. Mr. Frank Hodges, the Secretary of the Miners' Federation, has dealt with the matter not from the point of view of the right or wrong of it, but from those of precedent and the obligation of the Government. There are, according to him, obligations on the Government because they recognized national settlements during the war and since, and part of the pay on the national basis has been given because it was considered to be deserved, and in order to raise the standard of living. Therefore it is held that both morally and technically the Government should make it obligatory that there should be adherence to settlement on a national basis.

Mr. Hodges takes the case of the railwaymen as a precedent; and he points out that the railway guard on an obscure railway is paid the same wages as the guard on the greatest and most successful railway system in the country. The miners' champion is unfortunate in his choice of an example. What he advocates cuts-away all individual interest and incentive. If the guard on the smaller railway with his relatively light duties and responsibilities is earning the same as the guard on the greater railway with his heavier duties and responsibilities, then there is no incentive to the guard on the poorer railway to improve his position—in fact, the guard on the greater railway would have less work and responsibility for the same money by getting on to the smaller railway. However, the chief point for coal consumers about Mr. Hodges' statement is not his defective argument and stultifying theories, but the threat at the end of what he has to say, that if the Government persist in thinking that their obligations to the wage earners are going to terminate with financial decontrol, then it must result in a hard and desperate struggle on the part of the miners to safeguard that which the Government should, both technically and honourably, concede—apparently he means the continuance of the national basis.

This shows that the optimism of the owners has not at the moment any very safe foundation. But to revert to the agreed principles. The cardinal feature is a profit-sharing scheme—including standard wages, a minimum profit for the owners, and the division of surplus profits between the owners and the miners, with the profits ascertained by joint audit. The standards of 1914, it is proposed, shall be the basis of calculations as to wages and profits. It is obvious that, under such a scheme, the miners would benefit as much by the decrease of production costs as by the increase in the price of coal. This, if appreciated and worked-up to by the miners, should make for greater efficiency in the industry, and keep down the cost of coal to the consumers. These are the principles. They appear to afford a sound basis for effecting a workable agreement; but the mechanism of the Miners' Federation is so complex and far-reaching, and composed of such incongruous elements, that one never knows whether or not even fundamental principles will be accepted by the district delegates, let alone the fabric that may be constructed subsequently. There are in the Federation inventive minds; and from some of them insidious plans emanate, which have the effect of introducing complications and opposition to the best of schemes devised for bringing about peace. We have an example of this in the speech-making and newspaper writing of Mr. Frank Hodges, prior to the statement of his to which attention has already been directed. He has been advocating that wages shall be maintained at present rates by means of a Government subsidy until such time as the coal industry is thoroughly and soundly restored. It only requires a bare suggestion of this kind to set a large section of the miners in antagonism to statesmanlike schemes, and to start them clamouring for the full pound of wages to be preserved to them, no matter the cost to the country. The clamour becomes a mandate; and then the extremist parts in the mechanism cheerfully resume their nefarious work. How the industry is to be restored to an economic state with such a hare-brained proposal in operation is a point which Mr. Hodges does not trouble to explain; nor does it concern him in the slightest that the country's finances are at the present time in such a deplorable condition that every man among us is feeling heavily the effects. The groaning taxpayers of the country, who are pleading for economy, will wonder what manner of man is this who would increase their burdens in order to bolster up the miners' high rate of wages, and at the same time effectually prevent the price of coal falling, as it must do if the coal and other industries of the country are to recover themselves, to the benefit of all people, including the miners. But Mr. Hodges' proposal is of a piece with the pure selfishness which has been at the bottom of the policy of the Miners' Federation through the war and since. The workers in other industries will note the senseless proposal; and they will ask why the miners more than themselves should have their wages maintained at a high level by the artificial means suggested. The Government can never make themselves parties to such a piece of crudeness. If the coal industry is subsidized, why not the gas-fuel industry? The folly of the proposal is so palpable that, even in the ranks of responsible labour leaders, Mr. Hodges is not likely to find much support for it, whatever may be its influence in the coal districts.

It is quite obvious that until there is a reasonable adjustment of wages to work, and the price of coal descends, this country will be labouring under a serious handicap in trying to regain its position in the markets of the world. The miners are the men who can voluntarily do much that would be effective in this direction. If they do not do this voluntarily, they will be forced into submission not by the Government, not by the coalowners, not by the public, but by the operation of those economic laws which are gradually exercising their sway again throughout the world, and from compliance with which the British coal industry is not exempt.

## Rates and Electricity Schemes.

The rates collected in England, Wales, and Scotland have increased from £71,276,000 in 1913-14 to £148,750,000 in the current year. That is the startling fact which the

Ministry of Health made known in an instructive statistical statement issued last week. In some cases the rates have doubled or trebled since the year first named. Combined with the heavy increase in rates are the bulging taxes; and the sum of the two constitutes a tremendous burden upon the individual, industry, and trade. The individual, in consequence of this condition of things and the high cost of existence, finds it necessary to economize; and manufacturers and traders find their capacity for activity seriously curtailed. Local authorities must also retrench. One of the curious effects of the war is that many municipal authorities have brought forward schemes which, under normal conditions, would perhaps have been thought excellent and desirable, but which, not being indispensable, are not regarded with any great public favour in present circumstances. The schemes are mostly being held-up for the time being. There is another class of scheme in which local authorities are concerned. The Electricity Commissioners are considering huge projects for electricity generation by joint authorities all over the country; but the Commissioners are not having a happy time of it, owing to schisms among those chiefly concerned, and the intricacies of the problems involved. But it is to be hoped, whatever the decisions of the Commissioners in relation to these various schemes, that they will not be entered upon during the present financial chaos. It may well be that certain of the schemes will be considered by the Commissioners to be desirable; but desirability must be judged in the light of present circumstances. Two points are put forward in justification for a speedy start being made upon the work. The first is that it will give immediate employment; and the second is that it will help to re-establish industry by putting at its command cheaper power. The former is the result of a one-sided view; the latter is an assumption of the first magnitude.

As to employment. Naturally, the schemes would give employment on this particular work; but at what cost? The times are bad for raising the capital for such work; and the burden of this capital on the future of electricity supply would be permanent. Years would be required to carry-out the work; and during all those years the money put into plant and work would be unproductive. When the works were completed and transmission lines were in position, the development of the load to the point where maximum economy would be realized would mean the lapse of considerable time. These are conditions that are patent. But what do they mean? That during all this period of construction and load development, the costly works would be a charge on someone, and who but the already overwhelmed rate and tax payer—the rate and tax paying individual and industry? If such schemes help to swell the grievous burden of rates upon other industries which provide employment, and whose capacity for employment is already diminished by the inflation of the financial claims upon them, then their capacity for employment must be in the aggregate further effected. It was said at the Chester and North Wales electricity inquiry that the schemes then before the Commissioners would not affect the ratepayers—that they were bound to be self-supporting. But the conditions give and the proposals offer no guarantees; they rather point to predictions in these respects being falsified, the same as similar financial prophecies at the projecting stage of many other municipal electrical adventures have also been ingloriously falsified. In connection with this particular scheme, railway companies and local authorities not owning electricity undertakings asked for protection for the ratepayers. They see, as we see, that the cost of carrying out such schemes in the circumstances makes success more remote than would otherwise be the case, and ratepayers are beginning to rebel against having to support the trading undertakings of local authorities, instead of those using the service paying adequately to maintain it. Of course, if the electricity industry is prepared to carry the burden without recourse to aid from the rates, well and good. With such a pledge, there would then be nothing more to be said.

As to the other view—that these schemes will provide cheaper electricity, and so help to revive and advance industry by furnishing it with cheap power—this is all so vague, and in the circumstances so fantastical, that it is surprising the Commissioners can keep grave faces while listening to such submissions. The people who appear to be taking the least possible interest in these inquiries are the manufacturers of the country. They know that there is a good deal of nonsense electrically spoken regarding this matter. They know better than the electricians can tell them that their power costs are but a small percentage of their total costs. At the recent Exhibition at Olympia, Mr. J. C. Wigham, in a paper on "Electricity and Efficiency" stated that in one town which turns out £5,000,000 worth of goods each year, the whole of the electricity supply for running the machines only cost £25,000, which is merely 0·5 p.ct. on the value of the goods. Mr. J. W. Beauchamp, the Director of the Electrical Development Association, likewise pointed to the smallness of the bill for power in most works compared with the total costs. As a matter of fact, the manufacturers would far sooner that Government Commissioners were sitting to determine how wage and materials costs could be reduced than as to how the fraction of total costs represented by power could be problematically lowered. And will it be lowered by these schemes? What is gained on fuel costs, if the schemes are carried out to-day, may be more than swamped by capital and transmission charges. Manufacturers may actually find electrical power costing more under these schemes, unless that poor pack-horse, the ratepayer, has a bit more put on to his load. There are times when there is wisdom in procrastination. This appears to be one of those times.

## First Revised Dividend Payment.

On Friday morning of last week, the stockholders of the South Metropolitan Gas Company received their first payment of dividend under the revision powers of the Company's Act of last year. The sum of the individual dividend warrant, despite the deduction of 6s. in the pound for income-tax, looked much better made out on the 5 p.ct. per annum basis, less the interim payment at the rate of 3 p.ct. per annum, than when, under the Statutory Undertakings (Temporary Increase of Charges) Act, they consistently appeared made out at 3 p.ct. per annum.

## Thermal Efficiencies on Gas-Works.

Are gas-works in this country doing their utmost to secure the highest thermal efficiencies in their own gas manufacturing processes by chemical control and the utilization of waste heat, which could in some measure and manner be utilized? A negative answer is to be found on many works. In this country, gas engineers are looking well after structural efficiency and stability and production results. We are satisfactorily on the high road to these things; but they should be accompanied by efficient chemical control and supervision, and, as far as profitably possible, waste-heat utilization so as to attain the maximum thermal efficiency. There are works operating in this direction, but they are the minority. In continuous vertical retort working, more and more is being done. In some respects in connection with this matter of chemical control of processes and heat efficiency, German gas men are ahead of us. They have something, and that something substantial, to learn in other directions from gas practices in this country; but in the particular of chemical control and heat utilization, if we have not anything to learn from them, there are many British works that have something to copy from them. Without going into details here, perhaps the illustrated article in other columns on the Woodall-Duckham installation of vertical retorts at Dresden will be enlightening as to the thoroughness of control and waste-heat utilization that is being established in gas practice on the Continent.

## The Drop in Coal Production.

There has been a persistent reduction in coal production ever since the week ending Jan. 15; and there is no clear indication that demand will in the immediate future be so revived that discharged hands will be called back to the collieries. The output for the week ending Feb. 19 was 4,284,100 tons; while the highest week's production this year—that for the week ending Jan. 15—was 4,897,700 tons. There has been a week-by-week decline since then. South Wales is the greatest sufferer; but practically all the coal areas show a decline. For example, in the week ending Feb. 5, the output in South Wales was less by 282,039 tons than in the week ended Feb. 7, 1920. South Wales has been the most troublesome coal centre during the war; and the men there have been earning more money on the average than in any other coal area in the country. The business of the South Wales field is largely export. America, however, can now easily compete with us for foreign trade, owing to our producing costs and the low output per man. France, it is reported,

has sufficient coal to meet her needs for six months. And it is not only European countries that America is supplying, but it is sending to other quarters of the globe where British coal was formerly preferred. There is no need to look into the matter further. The decline in output is the result of the falling-off in demand. The miners have helped to bring the industry to the verge of ruin; and they have assisted to throw large numbers of themselves out of employment. They know this to be true; but they seem to find some thin satisfaction in trying, by mere word of mouth, to put the blame on the Government. That is not clever; it is not honest. Other people are able to judge for themselves.

### The Movement of the Clock.

The clock hands are to be moved forward by one hour on the night of April 2-3; in France they will be moved to midnight at eleven p.m. on March 14. For some things we shall not be sorry to gain the hour of daylight. It makes very little difference to the gas industry now. The passing years since the institution of the change have removed the visibility of its effects. Consumption, too, has been increasing by leaps and bounds; and now annual meetings are becoming so general that they sink all differences as between one half year and another. The electric supply undertakings in residential areas do not particularly appreciate the change. Many of them are, during the six summer months, actually working at a loss. This is freely acknowledged; and it does not bear testimony to any considerable increase in the day load for domestic purposes other than lighting. In fact, in some such areas, it costs more to run plant to meet the insignificant business that can be done during the daytime than the revenue receivable at power rates from the electricity consumed.

## OBITUARY.

### JAMES KEITH.

Mr. James Keith, Assoc.M.Inst.C.E., M.Inst.Mech.E., M.Inst. Mar.E., died of pneumonia on the 23rd ult., at the age of 72. A native of Arbroath, Mr. Keith was the eldest son of the late ex-Provost George Keith; and after receiving his education at Arbroath High School, he served an apprenticeship in his father's works. For the purpose of gaining further engineering experience, he visited Canada and the United States, and then started in business on his own account in 1868. He was the inventor of numerous hydraulic, heating, ventilating, and other appliances; and among the earliest of these inventions was apparatus for the successful and economical manufacture of mineral oil gas. Further, he was the originator of the modern type of sectional boiler for hot-water heating.

In 1900 Mr. Keith's business was amalgamated with that of the Blackman Ventilating Company, Ltd., and he became Managing-Director of the combined concerns—a position which he occupied up to the time of his death. The deceased gentleman was the pioneer in Scotland, in the engineering trade, of the 51-hour—and, later, the 48-hour—working week; and his employees in Arbroath were among the first to benefit by the introduction of these hours.

### WILLIAM WOODWARD.

The death occurred on the 5th inst., at Merrington Place, Rolvenden, Kent, of Mr. William Woodward, who was for some seventeen years Engineer of the Bromley Gas Company, and later was appointed Chief Engineer of the larger undertaking which resulted from the amalgamation, in 1908, of the Bromley and Crays Gas Companies. He retired in 1912, on the amalgamation of the Bromley and Crays Gas Company with the South Suburban Gas Company.

Back volumes of the "Journal" bear ample testimony to the engineering skill and the progressive ideas of Mr. Woodward. On more than one occasion it has been our pleasure to publish full descriptions of his work at Bromley, which descriptions clearly brought out the fact that he was the author of much that was of special interest there. When he took charge of the Bromley Company's works in 1890, the output of gas was only about 120 million c.ft. per annum; whereas by 1907 it had gone up to about 320 millions—which, of course, was largely added to by the amalgamation the following year with the Crays Company.

The funeral is at Rolvenden Church this [Wednesday] afternoon.

The death occurred on Feb. 28 of Mr. David Woodhead, a member of the Halifax Town Council from 1892 to 1901, Alderman from 1895, and Chairman of the Gas Committee for six years.

We regret to announce the death of Mr. Herbert Porter, F.I.C., aged 59, of Gateacre, Liverpool, Inspector under the Alkali Works Regulation Act for Cheshire and part of Lancashire. Mr. Porter's death occurred on Feb. 23, after only a few days' illness. He was appointed a Sub-Inspector under the Act in 1895, and became Inspector for the Special District of Widnes and Runcorn in the year 1908. The funeral took place at Allerton Cemetery, Liverpool, on the 1st inst.

## PERSONAL.

We are glad to be able to report that Dr. W. A. Bone, F.R.S., who recently underwent a serious operation, continues to make quite satisfactory progress, and that all conditions point to a good recovery.

Mr. Hubert T. Bailey, who recently retired from the firm of Messrs. Stephenson Clarke & Co., and who, at their request, has continued to assist the firm, has now definitely retired. Mr. Bailey was an early member of the Evening Star Lodge, having been initiated in 1880. He served the office of Master in 1895.

Mr. Henry Talbot, Chief of the Public Lighting Department of the South Metropolitan Gas Company, who retired, after 55 years' service, at the end of last year, was the recipient of a beautifully illuminated address. In the course of the proceedings Dr. Charles Carpenter paid a tribute to the long and efficient services of Mr. Talbot, and to his popularity with the staff of the department. During the last twenty years, he said, there had been a complete change in the systems of public lighting; and throughout it all Mr. Talbot's work had been invaluable. The new Superintendent is Mr. E. M. Severn.

The Council of the Institution of Mechanical Engineers have transferred Mr. S. O. Pacey, Gas Engineer, of Santos (Brazil) from the class of associate member to that of member.

## EDINBURGH GAS ENGINEERSHIP.

[Communicated.]

At a fully-attended meeting of the Gas Committee of the Edinburgh Corporation held on Thursday last, the five selected candidates for the position of Engineer and Manager of the gas undertaking were interviewed; and it was decided by a majority to recommend the Town Council to appoint Mr. Harry H. Gracie. Mr. Gracie, who has been associated with the gas-works for thirty years, is forty-nine years of age. At the present time he is Assistant Engineer and Manager, and also Superintendent of the Distribution and Sales Department. In his application he asked for a salary of £1000 per annum. The final vote was between Mr. Gracie and Mr. J. W. Napier, of Alloa.

Under the heading, "Is it Another Muddle?" the "Edinburgh Evening Dispatch" remarks that when the matter of the appointment comes before the Town Council it is to be hoped that the whole question of the gas management will be raised. In Mr. Herring's time, there was no large expenditure on a consulting engineer as we have to-day. Have the Committee gone into this; and does the new appointment make it unnecessary for the city any longer to retain such an official? If it was unnecessary with one manager, it should not be necessary with another (the paper observes), and it is to be hoped that the recommendation is in favour of a candidate whose qualifications will save the expense of a consultant. Every spending body in the country is urged to take the line of greatest economy. The post is vacant; and it is the duty of the Town Council carefully to consider which course is likely to lead to both efficiency and economy. A lively discussion is anticipated when the recommendation comes up for approval.

**Canadian Gas Association.**—The fourteenth annual convention of this Association will be held in Montreal, on Aug. 25 and 26, with headquarters at the Windsor Hotel.

**Southern Association of Gas Engineers and Managers.**—The Hon. Secretary (Mr. W. H. Bennett) intimates that a general meeting of the Association will be held at the Connaught Rooms, Great Queen Street, W.C., on Thursday, April 7, at 2.45.

**Automatically Shutting-Off Gas.**—There are still people who are so unaccustomed to gas that they seek to "blow it out," as they would a candle; and from time to time accidents arise from the extinguishing of the light in this manner—a fact that has led a New York inventor to introduce a device suitable for attachment to a gas-pendant, whereby a fan-wheel arrangement above the gas-jet stops revolving if the flame is blown-out, and thereby automatically shuts-off the flow of gas. The "Popular Science Monthly" describes the device in these terms: While the gas is burning, the heat arising from it causes a little fan-wheel above the lamp to rotate. Two balls attached to it by tiny chains are made to swing outward by centrifugal force, raising one end of a lever, the other end of which operates a valve in the cylinder attached to the gas-pipe. As long as the heat from the flame keeps the fan-wheel and the balls (which act like the governor of a steam-engine) whirling, the lever will keep the valve open, thus allowing gas to pass to the burner. If the gas is blown out, the wheel ceases its rotation, one end of the lever is depressed, and its other end closes the valve through which the gas flows.

# THE GAS INDUSTRY ON THE HEAT-UNIT BASIS.

## Special Articles.—X.

THE testing clauses of the Gas Regulation Act are examined, and that critically, by Mr. John F. Simmance in this week's contribution to the series of Special Articles. Mr. Simmance has spent the best years of his life in devising and perfecting testing instruments for the gas industry to meet both statutory and scientific requirement, with the view to ensure compliance with the statutes, and to raise efficiency in gas production and use. He is an authority upon these matters with a reputation, one of the qualities of which is an impartiality such as is not always found where personal interest also obtains. The criticism is open to the judgment of all who read, and therefore for their acceptance or rejection. Upon certain points of the article comment is made in our editorial columns.

## CALORIMETRY AND THE GAS REGULATION ACT.

By JOHN F. SIMMANCE, A.M.Inst.C.E., M.Inst.Mech.E.

I PRESUME that the invitation extended to me to give my views upon the Gas Regulation Act is from the point of view of one who is intimately identified with the testing of gas; and the title of this article—"Calorimetry and the Gas Regulation Act"—confirms this view.

I desire, in the first place, to say that I cordially support the underlying idea of the Gas Regulation Act, that gas should be made, tested, and sold on a heat-unit basis. I think that this idea carries with it the possibility that the various inconsistencies in connection with testing, with the competency of gas examiners, with the fairness of the tests, with the relationship between the test and the actual value to the public of the gas, will be abolished. It has long been a matter of wonder that an industry should have been bound and governed by a system of testing which might be vitiated by an incompetent locally-appointed examiner—a good enough analyst, perhaps, but with no knowledge of gas—or by the use of instruments accurate enough but placed in a badly ventilated room, and generally by the ease with which wrong results can be arrived at, either through bias, unfamiliarity, or even incompetency.

In the light of the hope I have expressed that the Act will do away with these anomalies, let me direct the reader to a brief summary of the testing clauses contained therein.

### THE POWERS OF THE GAS REFEREES.

In the first place, three officials of the Board of Trade—viz., three Gas Referees—are armed with powers which are very great indeed; and the provisions against the arbitrary exercise of these powers do not seem to be as strong as they might be. The Referees may make any prescription as to the places and times at which, and the apparatus and method by which tests, whether continuous or intermittent, shall be made to ascertain whether any undertakers are supplying gas in accordance with their obligation, the method by which such apparatus shall be verified, the time, and the form of report, and various other matters.

### THE ONLY APPEAL.

The only check against the arbitrary or unfair exercise of these powers which makers of gas will have, is an appeal to another official appointed by the same Government Department—viz., the Chief Gas Examiner, appointed by the Board of Trade.

The provisions as to this appeal are contained in clause 6 of the Act. They are to the effect that if a gas authority think themselves aggrieved by any prescription of the Gas Referees, they have to appeal to the Chief Gas Examiner within one month from the date of the prescription.

### THE INSUFFICIENT MONTH.

The first thing that strikes me as a practical man is that one month is not nearly enough, quite apart from the question whether an appeal to a Chief Gas Examiner appointed by the power that appoints the Gas Referees, is satisfactory.

I do not see what is to prevent the Gas Referees from prescribing a piece of apparatus designed by themselves or either of them, and prescribing the method of using the apparatus. And, however unsatisfactory or inconvenient it may prove in practice, it would seem to require a great deal of persuasion to induce the Chief Gas Examiner to condemn what his Board of Trade colleagues have prescribed.

I think (if I recollect aright) that the Gas Referees—whose powers hitherto have been confined to London Companies—could have their prescriptions objected to within six months; and on the point of time it is difficult for me to understand why it has been cut-down to one month. I have never come across any piece of apparatus about the accuracy or suitability of which I could come to a decision within a month.

However, from my knowledge of the way the Board of Trade have always exercised their functions, and of the way the Gas Referees have carried out their duties, I entertain no doubt that, notwithstanding the Act itself (and it is the Act itself which is the subject of my article), no undue advantage will be taken of the powers given by it.

Of course, the gas industry will recollect that under the Gas Referees' powers, which relate to London only, apparatus designed by one or more of the Referees has been prescribed from time to time. I refer to the Harcourt ten-candle power lamp, the table photometer, the Boys' calorimeter, and other devices; and I do not hesitate to say that in the opinion of those most competent to judge, some of the apparatus was by no means the last word in efficiency, and the method of use (which in one case underwent material alteration from that first prescribed) was highly complicated and inconvenient.

### TWO TYPES OF TESTS.

With respect to the type of test to which gas authorities will be subjected, a careful reading of the Act (as a layman) leads me to the conclusion that there may be one type for authorities making more than 100 million c.ft. of gas, and another type for those making less, but not necessarily so.

What section 5 says is that in the case of the larger undertakings, and in any case in which it appears necessary to the Gas Referees, the prescribed apparatus shall include a recording calorimeter. Under this clause, it would be open to the Gas Referees to say that "any other case" includes every gas company however small which is under the provisions of the Act, or they may say that smaller companies need not have the recording calorimeter, or they may say that larger companies, in addition to the recording calorimeter (which the Act says they must have) must also instal a non-recording calorimeter. I have, therefore, to deal with various alternative possibilities.

### THE RECORDING CALORIMETER AND SUPPLEMENTARY TESTS.

Let me first deal with the question which everybody knows I am personally interested in, but about which everybody who knows me will give me the credit of being as impartial as it is possible to be. I refer to the recording calorimeter. Assume that a recording calorimeter only is prescribed for use, as a guide first to the gas company, secondly as a means of ascertaining whether a gas company should be subject to forfeiture for a more or less momentary falling-off of calorific value, and thirdly for the purpose of checking the average calorific value in any quarter to enable the Chief Gas Examiner to determine the revenue the undertakers had improperly obtained.

For the first purpose—namely, the guide to a gas undertaker—I have no manner of doubt that there are recording calorimeters on the market (including that associated with my own name) which are sufficiently accurate for the purpose. For either of the other two purposes, however—namely, the question of penalty for a momentary lapse or for a quarterly lapse—I doubt very much whether any recording calorimeter has been made, or whether any recording calorimeter can be made, that will give a reading upon its chart which, without any question or checking, will carry the necessary legal proof to enable the penalty to be enforced, or the gas examiner to say that there has been a deficiency in the calorific value for the quarter—again for the purpose of enforcing a penalty.

There are so many physical difficulties in connection with a recording calorimeter itself, or the variation of conditions beyond control which occur from day to day, that I shall be very much surprised if it is possible to do anything more than I have succeeded in doing after many years of trial, many modifications of design, and many disappointments. What I have succeeded in doing is to make an instrument which, within the practical limits of variation in gravity of gas likely to be supplied by a gas undertaker, tested under conditions which vary within the actual limits encountered, extremes of temperature and of atmospheric pressure which are met with in practice, can be relied upon to be accurate to within 1½ p.ct. of the total heat value of the gas.

It seems to me that whatever may be the hope, claim, or belief of the designer of a recording calorimeter as to its unerring accuracy without any correction under all conditions, the Gas Referees will take great responsibility upon themselves if they say to the gas industry: "There is our prescription, based upon our knowledge, our hope, or our belief, and whatever that chart says at any time of the day or night is, and will be, your calorific power as defined by the Act."

Calorific power means a certain definite thing; and there is only one way of legally proving whether the reading of a recording calorimeter is accurate—viz., by comparison with a laboratory or other test which shall satisfy a judicial tribunal beyond all possibility of doubt as to the calorific power at the moment when the recording calorimeter recorded.

I want to stress this point, not because the Simmance instrument happens to be provided with facilities for making this comparison, but because it seems to me to touch the fundamental

issue, and to be a circumstance which in itself sets up a limitation to the use of any recording instrument for penal purposes.

A Question of Reconciling Tests.

Exploring another avenue of possibility, if the prescription of the Gas Referees with respect to the larger companies is that the penal test shall be made on a laboratory instrument, but the average calorific value for the quarter shall be ascertained on the recording instrument, then there will remain first the question of checking the recording instrument, and secondly the difficulty in reconciling (in the case of an adverse test, or otherwise) the gas examiner's test with the figure which happens to be recorded on the chart at the time he happens to make his test.

It seems to me that any divergence between the two will both weaken the effect of the momentary test made by the gas examiner for the purpose of enforcing the fine for deficiency, and also the continuous reading of the recording instrument, which after all is only made-up of a continuous series of momentary records of tests.

A Valuable Feature of the Testing Clauses.

One good feature in the Act seems to me that it will, to a very great extent, regularize the appointment of local gas examiners and give gas authorities a greater voice in protesting against the appointment of an incompetent person. In any case, the Act does give the gas authority liberty to instal a recording calorimeter (the observation of which the management understand and rely on), thereby always having on the premises, as it were, a gas examiner, silent but continuous, as a check on any sudden, mysterious, and occasional descent upon the little room at the back of the town hall, of which so many of us have had experience.

The Only Satisfactory Prescription.

I have dealt already in this article with the powers of the Gas Referees; and I pointed out the possibilities of arbitrary action. I do not wish it to be inferred that I think such arbitrary action will take place; but having regard to all the difficulties, I think it will be found that the only prescription satisfactory to the gas industry will be first the provision of an approved non-recording calorimeter which will conveniently give the total heat value for the purpose of the ordinary laboratory tests for penalties; secondly, the provision of a good type of continuously recording instrument; and thirdly, power to the gas company and the local authority to agree as to checking the recorder from time to time as a term of an agreement made in each case between the two parties, which will regulate and define the significance to be attached by the parties to the readings of the recording calorimeter.

These, I imagine, will probably be the lines on which the Gas Referees will act; and I am bound to say, for the reasons which I hope I have explained clearly, I do not see what other alternatives there are.

If Anticipations are not Justified by Events!

If my anticipation is not justified by events, which are after all in the hands of the Referees of the Board of Trade, subject to appeal to the Chief Gas Examiner (of the Board of Trade), then, from the point of view of calorimetry and the gas industry, I think that the industry will have to consider its position very seriously.

## ELECTRICITY SUPPLY MEMORANDA.

We are all more or less experimentalists. Inquisitiveness is part of our nature; and there is a fascination in trying something new. A "Medical Correspondent" of the Sunday "Observer" evidently possesses in a strong degree the desire to prove by personal experience. He is a strong believer in the use of non-smoke-producing fuel in his house; and like a wise man he employs gas. He is also a firm believer in the dictum of Prof. Leonard Hill, F.R.S., that those methods which simply heat the air in our living rooms are unphysiological, favouring the healthy action neither of the lungs nor the skin. Prof. Hill is an advocate of moving air in rooms, and so a keen opponent of air stagnation. Common sense, without medical qualification, tells us that he is right. The "Medical Correspondent" decided to experiment to ascertain whether or not a modern electric-heater would comply with the physiological views of Prof. Hill; but he almost wishes now that he had examined the matter logically and theoretically, and had left the practical experiment alone. He does not intend to pursue it, unless the Imperial Treasury comes to his aid. However, he has bought dearly the experience with the electric-heater that he installed. It was of modern form, and one that was highly recommended. It is one of those heaters with bar elements. Its use can be graduated; but it has to be full-on in cold weather; and then it consumes 2½ units of electric energy per hour, costing in his district 10d. per hour! Small wonder that the experiment is not being continued; and (quoting his own words) "for the sufficient reason that this one heater has already nearly ruined me—costing more than all the cooking, heating, and two or three hot baths daily, which has been done by gas." That was enough to terminate the experiment.

**An Expensive Heating Experiment.**

Another reason for its termination is that the "Medical Correspondent" found that electric heating, through what it does not do, is unhygienic compared with other forms of heating. The gas-fires fixed in the other rooms provide radiant heat, and continuously ventilate the rooms. In other words, the gas-fires possess the dual advantages of giving radiant heat and promoting the movement of the air, and so rooms do not get into that condition which the occupants of electrically or "centrally heated" rooms call stuffy, and find enervating. The electrical pleaders and defenders always, when this subject is brought up, start the silly old talk about the consumption of the "oxygen" of the atmosphere, as though the companion constituents of the atmosphere do not accompany the oxygen in enabling gas to fulfil its functions; and what is drawn from the room in this way is replaced by fresh air, unless a vacuum is to be created, and combustion unable to proceed. They also talk of the gas-fire not being in use all the year round. They are in use at that period of the year when people stay at home more, and when doors and windows are kept closed in order to check the entrance of damp, cold air. However, the "Medical Correspondent" has had his experience; and he thinks he has paid for it expensively. If it is any consolation to him, and he happens to see this reference to his article, he may be interested to know that he is not alone in having made electric heating experiments, and in having discontinued them. Many gas-fires to-day stand just where electric radiators were once fixed.

**Unhygienic Heating.**

There are electrical journalists who, if we accepted all they wrote as representing their genuine beliefs, we should have to proclaim as very deficient in common sense. A writer in "Electrical Industries" exhibits a fine reticence under the heading of "More Gas Propaganda." He will have many occasions to do the same thing if he requires to exercise his pen and brain in a like way. He seems to have been badly ruffled by Mr. F. W. Goodenough's recent paper on "Gas-Fuel Efficiency" at the Olympia Exhibition. There is nothing in the paper that was unfair, or is not demonstrable fact. But the critic will not apparently have anything to do with the facts. He keeps well away from them, and takes refuge in the old electrical method of dealing with them by making use of some platitudinal arguments originated long ago—before people began talking and thinking of thermal efficiencies as they are doing to-day. Mr. Goodenough, he says, has evidently adopted the military principle that attack is the best form of defence; and "the principle is probably sound enough when one is defending an old industry which already has yielded a great deal of territory." Has this writer closed his eyes to the facts of almost embarrassing increases of gas consumption since the war ended, and does he think that his electrical readers are such fools as to believe, because he chooses to make stupid remarks, that the gas industry is suffering from atrophy when they have evidence to the contrary before their own eyes? He also asserts that electric driving has become "standard practice in every kind of factory." Does this account for the evidence that Sir Dugald Clerk has supplied, which shows that the gas-engine makers are doing more business than ever? If he does not believe Sir Dugald, it will not make an atom of difference to the fact. Mr. A. H. Seabrook was recently showing in the "Electrical Times" that even with waste fuel, gas-engines can beat electricity; and he is doing this to wake-up electrical men to the use of waste fuel, and to looking after their own thermal efficiencies better than many of them are doing now. The national economy of fuel seems to be a small thing to the writer in "Electrical Industries." He planks the whole case for electrical operation on the efficiency of electric appliances. To go farther back than that is obviously to him either the height of absurdity or a not-to-be-spoken-of fundamental weakness of electrical argument. At the same time he does not go into the question of what are the efficiencies of electric appliances for the several domestic purposes. He says: "The public, in fact, do not care a rap whether the electric-generating station wastes 93 p.ct. of the heat units in coal; it does not understand that sort of argument. Therefore the moral of Mr. Goodenough's paper for the electrical engineer is simply to continue making people acquainted with the practical virtues of electric cooking and heating." In other words, his advice to the electrical engineer is just to ignore the 93 p.ct. of waste, and to "go nap" on the efficiencies and virtues of electrical appliances. What are these "virtues" at 2d., 2½d., 3d., and even 4d. per 3420 B.Th.U.? These are days when people have to study economy; and their expenses are not lightened in those places where the electrical undertakings are a charge upon the rates.

**Self-Accused Blind Wastrels.**

In housing schemes which are for the people, one might fairly have assumed that the tenants should have the right to exercise their free will, and choose which form of lighting best pleases them and suits their pockets. But in some instances this is not to be. The municipal suppliers of electricity are in these cases going to apply Prussian methods, and compel the use of electricity for lighting, whether or not the tenants like it. They can either have it, or leave the houses; that is the only choice they are to be allowed. The electricity undertaking, at whatever cost to the tenants and

**Autocracy of Municipal Electricity Suppliers.**

the ratepayers, is to have a share of the business; and as electricity is too costly for these people for cooking, heating, and hot-water supply, then the remnant of custom that the electricity concern can have is lighting. It is to have it. The Ealing Borough Council, we see, is one of these autocratic bodies. They have made a regulation rendering it compulsory—"compulsory," be it noted—for tenants of the municipal houses to make use of electricity for lighting in all dwellings in which electric wiring is installed. That is the position; and some of the tenants resent it. A "few" of the tenants, we read, have refused to use electric current on the ground that they cannot afford to do so except on the slot-meter system. Electric slot meters cost a lot of money to-day; and they are the cause of infinite trouble. Only recently one authority turned them out, because they and the customers on the system had had enough of their constantly ailing mechanism. Furthermore, these Ealing tenants are expected to pay a deposit of £1 before supply is commenced. To meet these cases, the Electricity Supply Committee have offered to allow them to pay in eight weekly instalments of 2s. 6d. a week. We sympathize with these people. They are the last to want to run one account for lighting and another for gas for cooking and heating. The latter they are bound to have if they want the convenient and labour-saving service of gas; and yet the same supply would give them at a very small additional cost the moderate amount of light they require. Later on, we should like to see a balance-sheet of the capital costs incurred for this piece of extravagance, the cost of the current supplied, and the revenue received from these houses, together with the other information necessary to enable judgment to be made as to profitableness or otherwise.

**Shop-Window Lighting.**

The members of the Illuminating Engineering Society who have a genuine desire to place the art of lighting upon a firm scientific basis are restless in their endeavours. But results are slow in coming. The crudeness of past ways has obstinate stability; and it is a big piece of missionary enterprise to try to convert the myriads of people who use light, and the professional people—who may be expert in some things, but not always in the science of lighting—who sometimes act as advisers of what is best for lighting, if advice is sought from them. At a recent meeting of the Society, Captain E. Stroud dealt with the principles of shop-window lighting. These principles are more honoured in their breach than in their observance. Good shop window lighting is one of the best means of attracting custom, and of adding to shop-window efficiency. But people have strange ideas as to what constitutes good shop-window lighting. Some seem to think it is the provision of a surfeit of light by means of glaring, naked, badly placed gasfilled lamps, which dazzle prospective customers, and make them turn away so as to exclude the glare from their eyes. Captain Stroud strongly condemns all this. Lamps should not be hung at eye-level; and there is no reason why they should take up space in the show windows, and be intermingled with the goods. What is wanted is that the light should be directed on to the contents of the windows from above; and the light sources should be concealed from public view. Inverted gas-lamps could be used in this manner with great advantage, and means for ventilation could also be adopted with them. They should be so fixed that it is practically impossible to observe the actual light source regardless of the point of view of observation. There should be cheap lighting by this means with inverted gas-lamps; and the cost of mantle renewals (which is a small matter with the inverted lamp) would work-out to much less than the renewal of gasfilled lamps, which have obtained some notoriety for their erratic life behaviour.

**The Schemes and the Cleavage**

The Electricity Commissioners have been sojourning at Llandudno holding an inquiry over many days into the Chester and North Wales schemes for developing the electricity supply in these areas under, it is hoped, a joint electricity authority. They found two fairly definite schemes; but the old want of unanimity. As the inquiries proceed, new points burst-out of them. They are quite proper; but they make an addition to complexity which will not lighten the work of the Commissioners. It is, however, better to have them examined at the genesis of the new order of things than to be brought up later on. The Chester scheme for which Mr. S. E. Britton, the Electrical Engineer of the city, is largely responsible, proposes a steam-station near the estuary of the Dee, and to utilize the low head water power on the upper reaches of the river. The second scheme is by the North Wales Power Company, who propose to extend their plant and mains over the entire area, to meet all the additional power required, and, as local generating plants become obsolete or worn-out, to take on the whole of the generation. The idea of Chester is that their scheme should at present cover the eastern portion of the area—leaving the western part to the Power Company. Under such conditions, some day the two schemes might be linked-up. We are not much concerned about the engineering schemes and problems; but there are other matters which interest us.

**Prices and Deficiencies.**

One of the things which is apparent is that the view is growing that local authorities stand more in the way of electrical development than private enterprise, and that this is one of the congenital drawbacks from which electricity supply in this country will always suffer, largely owing to the composition, and changing composition, of such authorities. Another point is that there was a large amount of optimism shown at the Chester and North Wales inquiry as to the schemes having financial soundness, and would not be a charge on the rates. Of what [electrical scheme, large or small, has the same thing not been said? And in what a good percentage of the schemes has the sanguineness been falsified in the event. The Town Clerk of Wrexham was present at the inquiry, and called attention to the hardship that would be imposed upon those municipal authorities who have generating plant the loans upon which have not yet been paid off. And he was asked to console himself with the thought that (if all comes out as is hoped) Wrexham would have the advantage of obtaining current at a price which would make it a commercial proposition to scrap their works instead of carrying them on at an annual loss. Where are the guarantees? Mr. Britton stated that under his scheme the charge for current would probably be 1½d. per unit; but those authorities having no loans to pay off might reasonably be expected to pay more than 1½d. This might mean that those who have done the proper thing in regard to loans might have to pay more than those who have been lax in attending to their obligations. Supposing a flat-rate of 1½d. per unit is charged for supplies in bulk (which by the way is not the much lower figure that the Power Committee predicted), will the current be supplied by the distributors at the flat-rate, *plus* their own expenses to the consumers, with simply discounts for large consumption and prompt payment, or will the widely divergent prices for different purposes still obtain? Local authorities not owning electricity supplies and the railway companies are very anxious as to what is going to be done about these schemes in the event of them not paying. They do not want to have to contribute to their support through the rates. Taxes and rates combined are a present burden that makes every man and every industry look very much askance at proposals for further financial commitments on the part of local authorities. The small amount that power costs represent to the total costs of industrial establishments does not make these schemes appear of such importance to the people who are really more concerned than are the electrical projectors. Their other charges—among which stands with ugly boldness the item for rates and taxes—concern them much more. The schemes cannot possibly be productive for some years to come; and this is not the time for heavy expenditure. Expenditure now will threaten ratepayers more severely than probably it would do if deferred for a time.

## Importance of Gas Lighting.

About 20 p.ct. of the gas sold to-day, said Mr. A. J. Smith, of Concord (N.H.), in a paper read before the New England Association of Gas Engineers, is for lighting purposes; and though this percentage may possibly decrease to 19, 18, or even 10 p.ct. at some time, it will be a long way off, if aggressive methods are used to hold present business, and to push modern gas lighting appliances. There are some cities where the lighting load is as much as 40 p.ct., and others where it is not more than 10 p.ct. The question of percentage does not, however, really mean as much as might seem at first sight, owing to the fact that gas sales in the United States have more than doubled in the past ten or twelve years, and naturally the percentage sold for lighting has decreased in like ratio with the increase secured from other appliances. Regardless of the question of percentage, it is doubtless a fact that there are a great many more lighting units in service to-day than was the case ten years ago. This is borne out by the fact that the largest manufacturer of mantles in America has now an annual capacity of 40 million mantles, as against a capacity of 7 millions ten years ago, and every manufacturer has correspondingly increased his output. In Concord, lamp sales increased 25 p.ct., and mantle sales 400 p.ct. in 1920 over 1919. The indications are that during 1920 there was more artificial gas passing through lighting burners than ever before in the world's history, and immeasurably more candle power being developed from it, because of the increased efficiency of the lamps. Mr. Smith thinks the greatest handicap to be overcome in the pushing of gas-lighting appliances is "aristocratic prestige"—the great human desire to have something a little later in fashion than the other fellow. As to this he says: "Many a time have I passed a house at night, and observed the owner with double-barrelled spectacles on, endeavouring to read by the light of a 16-candle power electric light; and I have pitied the poor rich man from the bottom of my heart. But he is bound to be aristocratic, regardless of the effect upon his eyesight. I know of an eye specialist who keeps a record of the people in his town who use electric lights for reading, as he considers them his best and most promising customers.

**Oil from Cannel Coal.**—According to the annual report of the State Industrial Commission to the Governor of Utah, oil development from cannel coal in the Colob field of that State is expected soon. The cannel coal is in a remote region at the head of the North Fork of the Virgin River. The United States Bureau of Mines analyzed a sample, and found that it yielded oil at the rate of 68·8 gallons to the ton. The coal has a percentage of 22·2 ash, and a nitrogen content of 1·3 p.ct. The United States Geological Survey report states that the Colob field contains 2672 million tons of coal, which is a sub-bituminous product, except for the cannel area.

# DESIGNED HINDRANCES TO PROGRESS OF THE GAS INDUSTRY.

By Norton H. Humphrys.

The hackneyed phrase "History repeats itself" suggests that communities, as a whole, are apt to be either ignorant or negligent in respect to the failures or mistakes of the past. As much seems likely to be true as applied to official regulation of the gas industry.

Some parts of the Gas Regulation Act, 1920, warrant a hope that the enormous expense and inconvenience caused by cast-iron regulations forced on all alike—such as sulphur or candle power clauses, and the fact that one or two stock patterns will no better fit the varying requirements throughout the country than two sizes of clothing would equip an army—had been recognized and appreciated in official quarters. But unless the gas industry is sufficiently strong to retain the provisions of the new Act in their complete integrity, that anticipation will not be realized. Indeed, the last state may be worse than the first.

Gas undertakings are subject to official restrictions of two kinds—one relating to finance, and the other to public welfare. There are prices and profits clauses, as also purity and quality clauses. The first are now placed on an equitable footing by arrangements that go far towards preventing a recurrence of the heavy penalization of shareholders that has been a prominent and gross injustice during the past six years; and freedom to vary the calorific value of the gas supplied, at three months' notice, if untrammelled, places the second class on an equally satisfactory basis.

A fair and unhandicapped start can be reasonably claimed for the new enactment. Following war experiences, the gas industry is entitled to an adequate recuperation period, to admit of overtaking the arrears that have accumulated in so many directions, and to suit itself to new environments, before being called upon to deal with entirely new departures. But these matters have escaped notice; and following the procedure connected with the inception of the Gas-Works Clauses Act, 1871 (which crystallized provisions that had been granted by Special Acts for some years previously, together with the sulphur and quality clauses fixed without sufficient general experience), the beneficent effects, both for consumers and producers, secured in 1920 stand a chance of being entirely frustrated by restrictions that may be carried so far as to over-ride clause 1 by practically controlling the quality of the gas supplied.

The average modern gas undertaking, equipped with fittings, maintenance, and complaints departments, and therefore in intimate contact with the consumers, is in a far better position to fix the quality and purity of gas that will in all respects (safety to health and property, efficiency, and price being all assessed at their proper value) give the greatest possible satisfaction to the users, and therefore command a large and sound class of business, than a scientist in a laboratory perhaps at the other end of the country, ignorant as to practical or local conditions. It is out to do business on a profit-earning basis, with permanently invested capital; and therefore is not likely to spoil prospects by the supply of an objectionable article, to overdose customers with carbon monoxide, or to enlarge gasholders and main pipes to admit of distributing constituents that do not even get a look in on the "bill."

Much of the existing gas legislation is based on the assumption that the user is bound to take gas, whether he likes it or not, in the same manner as gas undertakings have for years past been compelled by the Government to accept coal. The correctness of this assumption, if it ever existed, has been out of date, almost to the recollection of the "oldest inhabitant." Both sulphur and candle-power clauses were founded more on opinion than on fact, although strongly supported by scientific evidence. We now know that, under ordinary living and working conditions, there is nothing in the sulphur bogey; that the enormous sums expended in complying with it were practically wasted; and that any advantage possessed by 18-c.p. gas, as compared with 15-c.p., is discounted by the liability of the richer gas to "smoke" with very slight inducement in the way of draught, and the difficulty of consuming it in such manner as will secure the full value represented by the nominal quality. Yet for half a century local authorities have been fighting with expensive weapons over a few grains of sulphur or a candle or two—presumably for the benefit of consumers. They continue to believe in opposition on similar lines. An old-established notion is that privileges, such as an exclusive district or a maximum dividend, should be accompanied by a *quid pro quo*, and that the Act is a bargain for which the recipient must indirectly pay. The quality and purity clauses have necessitated the outlay of enormous sums. Who eventually pays the bill?

The same argument may be applied to the numerous restrictions now under consideration—some for the benefit of the public as a whole, others of a less general nature. The limitation of carbon monoxide, inerts, and methane, the minimum pressure at the railway depôt, the extraction of benzole, the sale of sulphate below cost for the encouragement of agriculture—what does it all mean other than a very definite outlay with a very indefinite return? Who eventually foots the ledger? Many of our legislators would vote for any or all of these restrictions as jocosely as they vote away millions of public money; regarding them as a "consideration" for the privileges granted by the Regulation Act, and entirely losing sight of the relief character of the measure.

The liberty as to value of gas supplied is limited by the requirements of the consumers. Some communities seem to accept 400 B.Th.U. with cheerfulness, as an improvement on 600. But is this of universal application? Would managers of small gas-works in residential parts of the country, where the flat-flame user (accustomed to 600 to 650 B.Th.U. gas) is still strongly in evidence, care to reduce even to the extent of 100 B.Th.U.? Also, the question is largely a matter of finance. The cheaper therm may not be practicable without a larger attendance of carbon monoxide and inerts. It is quite conceivable that a very advantageous process, from the financial point of view, may thus be put out of court. If that is so, who bears the loss represented by the difference between present manufacturing costs and those with the new process?

The effects of this class of restriction are so variable, and subject to the influence of local conditions, that while the advantages inherent to them can be secured in one place at inconsiderable cost, very different conditions may exist in another. They should be based on direct practical evidence, and they should be adaptable to fit local conditions. The scientific evidence in favour of the sulphur clauses has been proved incorrect; and in many places the extra two candles has been more active in the production of sooty ceilings than in benefiting the user. But "history repeats itself!" The Committee inquiry on carbon monoxide includes a large amount of scientific evidence founded on artificial conditions; and that on the effect of inerts in connection with domestic usage opens with a somewhat incoherent statement representing the views held by one particular class of industrial users. We, again, have the scientific opinion and the artificial conditions. Millions of working, living, and sleeping apartments are available as sources of positive evidence; so why fall back on abstract opinion and the varnished box? The reason is obvious. The case is too weak to stand without artificial support.

Carbonic oxide in gas was fully considered by a Government Committee in 1899; and the conclusions they arrived at may be gathered by the fact that, after hearing exhaustive evidence, it was allowed to go by default. And now, at a most inopportune time, it is resuscitated, although the all-round evidence as to need for further inquiry favours the negative. The twenty years' sleep may extend to thirty, without anyone being a penny the worse. Much has happened in support of the suggestion that a carbon monoxide inquiry is less necessary in 1921 than in 1899. Twenty years' additional experience counts for something. The younger generation have never met the village-trained maid who blows the gas out before retiring at night, or lights-up all the burners on the gas-cooker punctually at 6 a.m., *à la* kitchen fire. It would be very difficult to find anyone who did not know what to do in the event of an escape of gas. Under the encouragement of the outdoor department—now a general feature—a better class of fittings and appliances is introduced and fixed by specially trained workers, in place of the uneducated plumber or painter who formerly practised gas-fitting as a side-line. The general adaptation of incandescent burners and of slot meters with an automatic shut-off reduces the risk of accident through taps being left open. The average living or sleeping room, formerly lighted by two 5-ft. union jets, is now served by one "C" or No. 3 "K" incandescent burner. There is a greatly increased appreciation of the importance of fresh air; and the regular use of the open window is an established rule. Notwithstanding the vagaries of the past six years, many of the younger generation of gas engineers have never had personal experience or acquaintance with accidents due to inhalation of town gas. It is generally known that people who favour the varnished box class of habitation are more likely to be injured by acumulation of organic poison than by escaping gas or products of combustion.

All direct evidence is opposed to, rather than in favour of, anything in the way of cumulative poisoning, either from carbon monoxide or benzole. Note, in the obituary columns of the "Gas Journal," the ages attained by men who have spent the greater part of their working lives on a gas-works. Personal experience covers sixty years association with gas-works, without the slightest sign of any weakness due thereto. The same with the gas-works employees. The difficulty is how to provide for the old hands; hence the adoption of pension schemes. A usual feature at the gas-works is a healthy old man who clears the drip-boxes and attends to similar odd jobs, and has been regularly employed there for fifty years or more. I have occasionally visited tar distilleries, and understood that general health and activity were above rather than below the average. The cumulative theory withers in the light of positive facts.

We do not seek to prevent travelling casualties by limitation of road or rail motors to a safe speed; or fire disaster by forbidding the use of inflammable material. Similarly, precautionary measures for dealing with the distribution of harmful gas might with more advantage take the direction of prevention of leakage by periodical inspection and testing of fittings. Gas undertakings are required to adapt the consumers' burners, if necessary, to the declared value of the gas; and arrangements for the prevention of leakage might likewise be adapted to the character of the district, and the composition of the gas.

---

At a meeting of the Illuminating Engineering Society at the Royal Society of Arts, on Thursday, March 17, Major A. Garrard will open a discussion on "Motor-Car Headlights."

# MIDLAND ASSOCIATION OF GAS ENGINEERS.

ON Thursday last the Annual General Meeting of the Midland Association of Gas Engineers and Managers was held at the Grand Hotel, Birmingham. There was a representative attendance; and at the opening of the proceedings Mr. JAMES R. DUFF, of Banbury (the retiring President), occupied the chair.

### LOSSES BY DEATH.

The PRESIDENT alluded in fitting terms to the death of Mr. A. T. Harris, of Market Harborough, and Mr. S. Trow Smith, of Malvern. Tokens of their sorrow were sent in each case; and the Association was represented at the funerals.

### NEW MEMBERS.

The following gentlemen, who it was stated had been nominated for election, and whose names had been approved by the Committee, were elected members: Mr. Cecil Rhodes Armitage, of Etruria; Mr. W. C. Goodchild, of Derby; and Mr. H. C. Hess, of Chipping Norton.

### HONORARY MEMBERS.

Messrs. William Chaney, late of Birmingham, Henry Peaty, late of Burslem, and John Young, late of Hull, were elected honorary members.

The PRESIDENT pointed out that the Committee had gone carefully into the matter and had come to the conclusion that this was the proper course to take.

### VICE-PRESIDENCY.

The appointment of Mr. W. H. Adams, of Bilston, as Vice-President in the place of Mr. W. M. Valon (Stafford) was approved.

The PRESIDENT expressed regret that Mr. Valon had had to resign the position, but assured the members that in Mr. Adams they would have a gentleman who was fitted to follow on in due time to the highest office the Association could entrust to him.

### REPORT AND ACCOUNTS.

The PRESIDENT next proposed the adoption of the annual report and accounts, and in doing so called attention to the outstanding subscriptions—£12 1s. 6d.

Mr. W. E. CATON (Oxford) seconded the motion, which was passed.

### REPORTS OF DISTRICT ASSOCIATIONS.

The PRESIDENT, alluding to the "Transactions," said difficulty had arisen with reference to their being printed, owing to the falling-off in the number of applications for them from members, which had gone down from 94 copies in 1918 to 39. In his opinion, it would be a serious loss if the reports were discontinued, because they certainly constituted a splendid reference for any engineer. He found that members referred to them pretty often; and it seemed a pity that advantage should not be taken of such a valuable compilation.

The SECRETARY said he gathered that there had been a similar falling-off in other Associations.

Mr. GOODCHILD put forward the idea of having an inclusive subscription in order to secure that all members would get a copy of the proceedings.

Mr. W. G. S. CRANMER urged the need of the co-operation of other Associations; and he suggested that a conference of representatives of the different Associations should be convened to see if it were possible to come go an agreement to make an inclusive subscription. The Midland Association could not independently act effectively.

The PRESIDENT agreed that such a course might serve a very useful purpose.

Mr. C. H. WEBB (Stourbridge) suggested that economy might be effected by adopting a cheaper binding.

Mr. GOODCHILD thought that if the reports were issued twice a year, instead of once, they would be fresher to the members; and the volumes would not be so bulky.

It was agreed that the Association should get into touch with kindred bodies and see if it could be arranged to include the cost of the reports in the subscription, instead of leaving it optional to the members as to whether they would take the volume, as at the present time.

### THE COMMERCIAL SECTION.

The PRESIDENT then called upon Mr. H. Pooley (Leicester), the Chairman of the Commercial Section, to give a résumé of the work of the year.

Mr. POOLEY said he felt an apology was due from him in that no proper report was forthcoming—his excuse being the cloud under which the Association was resting owing the death of the Secretary, Mr. Trow Smith. Meetings of the Association were held frequently during the year; and the subjects discussed included the 10s. rebate on domestic coal and the allowance to be made to domestic consumers of gas. Coal supplies generally were also discussed from time to time, together with the position of the coke market, the Midland tar scheme, and ammonia products. The values of scrap metals and even the offer of German gas-mantles for sale in the Midland area were considered. The meetings were most useful and helpful, and the interest of the members was demonstrated by the free and full discussion which took place.

The report was adopted on the motion of Mr. JAMES PATERSON, of Cheltenham, who thanked Mr. Pooley for his remarks, and expressed, on behalf of the members, appreciation of his work in connection with the Commercial Section, the value of which was considerable.

The resolution was seconded by Mr. H. HADDOCK (Atherstone), and agreed to.

### PRESENTATION TO MR. CRANMER.

The PRESIDENT, on behalf of the Association, handed to Mr. Cranmer a purse of Treasury notes and a beautiful chiming clock as an expression of appreciation of his excellent work as Hon. Secretary during the past seven years and as a token of personal esteem. The members were mindful of his services during the difficult times of the war. He hoped that Mr. Cranmer would always look back upon his seven years' secretaryship with pleasure, and that the chimes of the clock would remind him of pleasant days. [Hear, hear.]

Mr. CRANMER, acknowledging the gifts, said the work of the secretarial office was pleasant, and he would miss it. If he had known what he had taken on when he accepted office—well, he would not have taken it on. [Laughter.] It was an abnormal time; and not only the work of the Association but his own private work made it difficult to undertake private jobs.

### INDUCTION OF THE NEW PRESIDENT.

The PRESIDENT said his next duty was a pleasant one—though it was not unmingled with regret so far as he was concerned—and that was to introduce Mr. James Paterson into the chair of the Association. The year had gone all too quickly for him (Mr. Duff); for the work of the Association was very interesting. But he had great pleasure in handing over the chain of office to Mr. Paterson, knowing that he was passing it on to a gentleman of high standing, who would look after the interests of the Association right well.

Mr. PATERSON was invested with the chain of office, and was applauded on taking the chair.

### VOTE OF THANKS TO THE OUTGOING PRESIDENT.

The PRESIDENT opened his year of office by proposing a hearty vote of thanks to Mr. Duff for his services during his presidency, and congratulated him upon the very successful way in which he had discharged his duties. They would all retain for many years pleasant memories of the visit which they had paid to Mr. Duff's works at Banbury, where they had a most delightful and interesting time.

Mr. B. W. SMITH (Walsall) seconded the proposition, which was heartily approved.

Mr. DUFF, in acknowledging the resolution, referred to the visit to Banbury, and said he knew his Directors were delighted with the success of the visit, and with the kind remarks that were made as to the plant installed there.

### REPRESENTATIVE ON THE INSTITUTION COUNCIL.

The PRESIDENT explained that it was the ordinary practice of the Association that the President should be their representative on the Council of the Institution of Gas Engineers; but in the present case it happened that he was already on the Council as an ordinary member. It therefore seemed desirable to the Committee that they should ask Mr. Duff to continue as their representative on the Council of the Institution for another year.

Mr. C. M. D. BELTON (Shrewsbury) seconded the motion, which was approved.

Mr. DUFF replied that he would be pleased to represent the Association for another year.

---

The President then delivered the following

## INAUGURAL ADDRESS.

Let me first express my thanks to the members of this Association for the honour conferred upon me in calling me to the office of President. I am deeply conscious of the long line of distinguished occupants of this chair, whose names stand out as pioneers in gas engineering and administration; and I feel that we all have a big task in front of us, individually and collectively, to prove ourselves worthy—if so it may be—of our ancestors in gas in the Midlands. The district comprises all classes of undertakings, from the great concern that supplies the Metropolis of the Midlands, through the range of works operating in the surrounding industrial areas, to the undertakings that minister to the requirements of residential centres and the small works situated in agricultural districts.

Each of these distinctive groups has its peculiar problems; but looking on the industry as a whole and—as one should do from time to time—endeavouring to stand apart and view the situation as it exists to-day, one essential requirement appears to be pre-eminent. Putting the matter as briefly as possible, the most intimate details of each concern must be ruthlessly brought into the light of day, and the established practice of the past must be examined under the test put into our hands by the searching ex-

perience of the years that have passed since the outbreak of the great war.

### Investigating a Gas Undertaking for Higher Economy and Efficiency.

The problems that beset our forbears, in what we now are inclined to look upon as the halcyon days of the pre-war period, were none the less of grave import; and as we know, in their surmounting, a sure foundation was laid upon which in these latter days we must build and carry on the structure of the gas industry. It is, however, these very foundations of practice which I consider we must examine, in order that weak places (if any exist) may be detected and rectified; and to carry the image further, there may be even cases where a solid heavy monolith at the base may be profitably replaced by a comparatively light but effective raft of reinforced material. Such fundamental matters as coal and coke handling, economical purifying routine, office organization, and the multifarious details of the distribution department, should for example be closely examined to see whether the work is being conducted on the most economical and withal on efficient lines. Careful investigation of stores handling, for instance, may reveal that the old or existing method which "grew" with very little, or at any rate spasmodic, directing in the past, is capable of simplification on broad and novel lines—thus effecting economy coupled with still greater accuracy.

I am tempted to give an example of the thesis I am endeavouring to establish, drawn from the practice of the undertaking that I have the honour to serve. The fundamental basis of our retort-house working in the past was the carbonizing of a small charge of coal to be quickly worked-off, and then withdrawn in the usual way, to be replaced by another charge. The charge of coal in a 9 ft. 6 in. (stopped end) retort was approximately 2½ cwt., and there were five charges in the twenty-four hours. This entailed a relatively large retort-house staff; but in pre-war days at pre-war rates of wages, coupled with an admittedly high yield of gas per ton, the cost of labour was not excessive.

In quoting the actual figures, I take the ten years ended the 31st of December, 1894, throughout which period the average yield of gas per ton was 11,247 c.ft., or to give an even more significant figure a tonnage yield of 10,659 c.ft. of gas actually sold—the difference between this and the former figure being, of course, made up of gas used on the works and unaccounted-for gas. Now the two points steadfastly borne in mind, and which I consider were successfully achieved by this retort-house practice were, first, the utmost production of gas from the coal carbonized, consistent with, secondly, adequate illuminating power of the gas. Testing for illuminating power in those old days was a solemn process, and was carried out with all care and due observance of the prescribed ritual.

In this connection, it is interesting to find that the average illuminating power of the gas throughout the period now under review, as tested by the Official Corporation Examiner, was 16·24 candles; while the Company's own average tests showed 16·23 candles. It will be understood, of course, that the gas was burnt in a No. 1 argand burner and with a 6-in. chimney.

### Production of Heat Units—Re-casting of Ideas Essential.

Now, these two criteria of established practice—a substantial yield of gas per ton, coupled with ample illuminating power—have to be reviewed in the light of conditions obtaining to-day. Illuminating power, modified as it was by the advent of the No. 2 "Metropolitan" burner, is to be banished, where it has not already departed, to the limbo of forgotten things. Calorific power as a means of defining the value of our gas, compels us to recast our ideas, and to modify our carbonizing plant and methods; and the present-day conditions of labour certainly prompt us to adopt processes which, while lightening if possible the arduous work of the retort-house, avoid an excessive staffing for the necessary operations.

I do not presume to indicate in what way I consider the problem should be tackled, or to say whether in my opinion the best line of attack is being pursued by those who have already been working to a calorific standard. The matter is clearly a physico-chemical problem; and the question has to-day a better chance of solution by serious experiment and investigation than was possible in the last century, when empirical methods were practically the only tools in the hands of most gas engineers.

To my thinking the most valuable contribution on this problem hitherto published is to be found in the "William Young Memorial Lecture" delivered by Prof. J. W. Cobb in the year 1918. I would direct the renewed attention of gas engineers to this intensely interesting thesis, built-up as it is upon a carefully conducted series of laboratory experiments. If one were to attempt to summarize the net result of Prof. Cobb's investigation, it would, I think, be to say that he establishes the all-important effect of gaseous atmosphere upon the process of carbonization. It is surely not far from the truth to conceive that this theory holds-out the most promising hope of light on the hitherto unrevealed secrets of carbonization.

I have gone to some length in indicating, in however superficial a manner, one example of the kind of investigation of our ancient standards and practice that I have in mind. I would not wish it to be thought that, in adducing to such an example as this, I ignore the change in practice brought about by the filled-up retort, with longer hours of exposure to the heat of the retort. I have merely taken a fairly remote practice, and trust I have shown how the underlying principles forming its basis must of necessity to-day be subjected to scrutiny from a new view-point.

### Mechanical Operation.

Another example may be quoted of an altogether different kind of inquiry—being one I recently carried out in the endeavour to eliminate the man, horse, and wagon for coke delivery in favour of mechanical traction. The whole problem was found to pivot about the "turn round" at the delivery end. If a tip-wagon could have been used, a real economy in the cost of delivery would have been possible. As it is, with our large domestic trade very often involving a long "carry" of the coke, it was found that with an average mileage per journey of slightly over 3 miles out and home, the number of men necessary to be carried to effect a quick delivery would defeat the economy of the means of transport. Although such an inquiry gave a negative result, it was at least satisfactory to know definitely that the existing method of coke delivery withstood to-day at any rate the test of comparison with alternative methods.

In spite of this instance, it is none the less true that generally speaking it will be found that economy and efficiency lie in the direction of adopting mechanical appliances, in place of direct manual labour. Such examples as telpher plants for coke handling, and mechanical devices for unloading coal, both of which have been recently introduced into the works under my charge, prove their value and economy daily.

### Unproductive and Unrepresented Capital.

Another interesting subject comes under notice in the process of reviewing the past in the light of the present. I refer to the capital expenditure of gas undertakings—and more particularly perhaps with reference to companies than to local authority undertakings, whose capital is extinguishable by operation of the sinking fund. How many managers can say with accuracy how much of the plant and works under their control is profit-earning, and how much, if any, is unproductive. An analysis of the capital expenditure of the concern is most illuminating, and may often show how the gradual growth of the undertaking has rendered part of the capital outlay of no present earning value. It is satisfactory in the highest degree that provision is made in the Gas Regulation Act, under section 10 (2) (*g*), for the granting of Special Orders for, among other things, "the purchase or redemption and cancellation of . . . obsolete or unproductive capital, or capital not represented by available assets." Such a transaction has been rarely possible in the past, and then only under powers conferred by an Act of Parliament. It is clear, however, that the cancellation of such capital will be to the ultimate advantage of the consumer, in reducing the cost of provision for interest; and the operation will tend to the further stability of the undertaking. It is a taunt that has more than once been heard that the capital of a gas company, once expended, carries for ever the burden of dividend charges; and it is well that we shall now have the power, if any of our capital becomes or has already become ineffective under the three heads mentioned in the section, of providing for its ultimate extinction.

In these days of high rates of interest it is of the utmost importance that capital values already expended should be fully maintained as a direct maintenance charge; the "overhauling" and close introspection of existing outlay being as thorough as I have indicated should be the case with working operations and processes.

### The Gas Regulation Act and a New Era of Activity.

The Gas Regulation Act itself calls for something more than passing notice. To my thinking the Act marks the beginning of a new era of activity in the gas industry, which must surely bring to all concerned, whether producer or consumer, the greatest ultimate benefit. So great may be the possibilities of the future that it were well-nigh impossible for us to-day to gauge fully the advantages that must accrue. The active part taken generally by the National Gas Council, and in particular by the President, Mr. D. Milne Watson, in helping to give form and substance to the new Act, have shown the inestimable advantage of bringing all undertakings, whether publicly or privately owned, into one united body, and of pooling in this way the collective knowledge and skill of the whole industry.

It is to be presumed that the changes to the new method of charge will proceed steadily throughout the present year, and as happens in other analogous cases, the full significance of the change will often be not adequately realized by the respective undertakings until life under the new régime has commenced. We are told on all sides to "think in therms;" and it is going to be physically difficult to drop all at once our "yield of gas per ton" standard. Such a standard will remain of use to the undertaking which proposes no change from the quality of its gas obtaining immediately before the application of the Act. But in comparing working results with those of other undertakings, the therm can be the only basis for comparison. The highest yield of therms per ton of coal at the lowest possible cost (including all charges) is, I conceive, the ideal for gas engineers to set before themselves; and I for one—and I may not be alone in this—include among the essential charges that full attention to the consumer which in many cases had to be dropped, or at any rate much modified, during the war.

### Maintenance of Gas-Using Appliances.

"Free" maintenance is of course a misnomer, because after all someone (and eventually that someone is the consumer) pays for

the cost of such service. None the less, attention to burners, fires, cookers, and all gas appliances—even if not directly charged to the consumer—is in my opinion a necessity, if full and continuous use of gas is to be attained. It is a service which in the vast majority of cases is appreciated by the users of gas; and last, but not least, it is the most effective way of maintaining the position of gas in face of its active competitors in the fields of light, heat, and power. It may be useful to state from the sellers' point of view that the new unit of gas, the therm, is equivalent to twenty-nine times the amount of heat obtainable from a unit of electricity.

### CALORIFIC POWER LOSS IN DISTRIBUTION.

I am not aware of any published reference to a possible drop in the calorific value of gas in the process of distribution, although it must be certain that records are extant which would throw light upon this point. At the time when we were distributing a gas of 510 B.Th.U. as measured at the works, we found from a number of tests taken at the town testing-station about a mile away, using the same calorimeter transferred for the purpose, an average drop of approximately 2 p.ct. It is difficult to accept as accurate such a large difference, in view of the many factors in the case; and much more evidence is required to establish the exact position. It is certainly likely that the loss (if any) would be less with a low-grade gas than with a gas of comparatively high calorific value. An average of a large number of tests taken with carefully calibrated apparatus, or better still with recording apparatus and a subsequent integration of the resulting curves, would show how the calorific value of gas is affected, if at all, by the process of distribution.

### LOAD FACTOR.

I cannot refrain, in conclusion, from referring to some notes which I contributed to the "GAS JOURNAL" in August, 1912, on the subject of load-factor, because to my thinking there is a danger of gas engineers allowing themselves to be unwittingly misled by the consideration of this subject in its application to gas supply. My notes were an outcome of the study of Mr. H. Townsend's interesting paper to the Institution of Gas Engineers in that year; and I took as a basis the principle that our standard of load was a day's supply. The electricity central station, owing to the impossibility of storing electricity, has perforce to take an hour's supply as a standard of load, and inasmuch as the station has to contain plant capable of supplying its maximum hour's load, the ratio of the *average* hour's load throughout the year to the maximum hour's demand on the feeders, gives the load factor, which is generally expressed as a percentage. The nearer the average hourly output approximates to the maximum hour, the higher becomes the load factor.

In the case of gas supply, a high demand for gas at certain hours of the twenty-four merely draws on the stock in the holders, which are filled up again during slacker hours; so that a high day consumption in itself is of no advantage in reducing operating costs. The production of gas goes forward regularly throughout the twenty-four hours; and a high day-load merely necessitates a larger twenty-four-hour production—in itself, of course, a desirable thing. My investigation of the Cheltenham Gas Company's day-load factor showed that the enormous increase of consumption, largely in the day time, due to the advent of cookers and fires, had brought about no material increase in the day-load factor as shown by figures relating to a large number of years.

Consideration of the day-load factor thus appears to have small significance for us. What is more important is the relation of supply in the winter time to that in the summer time. The higher the summer load is in comparison with the winter load (which latter with most undertakings is the larger), the more equably our plant will be employed and the less plant will be standing idle through the summer months in readiness for the winter peak. It is the provision of the plant for the peak of the winter load which is comparable with the electricity maximum load stand-by plant; and in spite of the set-back of summer consumption by the operation of "Summer Time" on the one hand, and the ever-increasing use of gas for heating in the winter months on the other, it is interesting, and at the same time gratifying, to note how in a residential area at least the tendency still appears for the trough of the summer consumption to be levelled-up towards the peak of the winter output.

### OUR AMBITION AND IDEAL.

Reference has recently been made to the "romance" of the gas industry, and with great truth. But an incurable optimist like myself may perhaps be permitted to hold-out a vision of the romantic possibilities in the future for the industry. The experience of the coal rationing period probably brought many gas engineers, like myself, within the knowledge of the amount of coal required for domestic purposes in their respective towns. Here surely is the measure of our field of harvest. Our ambition and aim should be the replacement of the whole of this coal—consumed as it is with enormous waste of valuable products and the formation of clouds of rank smoke—by our two chief products, the coke suitably prepared for use by those who desire or require a solid fuel, and the gas of an equable quality and gravity, supplied at a pressure fully adequate for its economical utilization. Much is to be done to reach this end, if ever it can be completely attained. The price of our gas for instance must be such as to furnish an irresistible inducement to the householder to discard altogether his coal grates. To-day this may seem a hard saying; but I have faith, in view of what has been achieved in the past, that the future may disclose the means of reaching the ideal I have set forth, and that gas engineers and managers of the Midlands may play a worthy part in the consummation.

---

Mr. DUFF proposed a hearty vote of thanks to Mr. Paterson for his excellent address, observing that it was bristling with interesting points.

Mr. LANGFORD, in seconding, remarked that it was an address which would give them plenty of food for thought when they had an opportunity of seeing it in the technical journals.

Mr. POOLEY said he had great pleasure in supporting the resolution. He had a pleasant recollection of the exceptionally kind way in which Mr. Paterson's father had proposed a vote of thanks to him in similar circumstances. He had known the family through three generations. The grandfather of the present generation was a man for whom he had the highest veneration; and the father and the uncle of their President were intimately associated with his life. Of Mr. James Paterson he could say the same. He had given them a most masterly piece for thought—quite free from the hackneyed—for it was bristling with material of the past, the present, and the future.

The resolution was carried with enthusiasm.

The PRESIDENT said he much appreciated their kindness, and the evidences of appreciation of his effort.

### DISCUSSIONS IN COMMITTEE.

A discussion on "Fitters' Timekeeping," introduced by Mr. R. G. MARSH, of Birmingham, followed, in committee. There was also a discussion on the subject of "Ammoniacal Liquor and the Cost of Production of Sulphate of Ammonia," introduced by Mr. W. C. JONES, of Brierley Hill.

Mr. Marsh was thanked for his contribution.

The PRESIDENT called attention to the question of the payment of subscriptions.

The meeting then terminated.

---

## NORTH MIDDLESEX GAS-WORKS.

### Under Co-Partnership Conditions.

Looking backward, and calling to mind good work done and the many pleasant outings participated in, those connected in any way with the London and Southern District Junior Gas Association must realize that it has reached quite a good age. It has, in fact, been in existence long enough for the members to pay three visits to the Mill Hill works of the North Middlesex Gas Company, which, curiously enough, circumstances have placed at intervals of seven years apart. The first was in 1907, the second in 1914, while the third took place last Saturday afternoon. The "circumstances" referred to have been the presidency of the Association in 1914 of Mr. S. A. Carpenter (who is connected with the selling side of the Company's business), and this year of Mr. Frank J. Pearce (the Works Manager). Circumstances, it must be confessed, do not always arrange things so well as has been the case with the periodicity of these visits, which could hardly have been better timed.

If it is true (and it certainly is) that there is invariably something to be learned on a gas-works, this is much more so when the visit is repeated after a lapse of some years. That the gas industry never stands still is brought home to one by such repeated visits more, perhaps, than by any other means. In the case of the North Middlesex Gas-Works, for example, at the time of the first visit in 1907, the retort-house was fitted with direct-fired furnaces and shovel-charged retorts; whereas by 1914 the retort-house had been reconstructed for the accommodation of up-to-date machine-charged settings. Now the works are under new working conditions, which have opened quite a fresh chapter in the Company's history. In such a good-class residential district (which has of recent years undergone rapid development) the output of gas since 1906 has naturally made great strides. The quantity sold that year was, in fact, 156 million c.ft.; for 1913 the amount was 285 millions. When building starts again in earnest, Mill Hill, Hendon, Golder's Green, and Finchley may be relied upon to have their fair share of new houses, with a consequent further increase in the business of the Gas Company.

Now as to the changed conditions under which the works were seen last week. It will be remembered that a little over twelve months ago—at a time of great stress and difficulty—the Company were the victims of one of those lightning strikes practised by certain sections of labour with the object of paralyzing industry, and so enforcing compliance with demands that may be either reasonable or unreasonable. In this case the matter in dispute was the employment of non-union labour; the Company having decided to define their attitude by the posting-up of the following notice—which is still to be seen where it was then placed:—"The works of this Company are free; and no worker therein, whether male or female, is under any compulsion to join or abstain from joining any trade union." In this case, however, the men had more than met their match; and with volunteer help, and hard work on the part of the staff, the supply of gas was maintained until the works were re-manned throughout. The sequel to this was the inauguration of a co-partnership scheme; and it was the change wrought by the advent of this scheme which formed one of the main topics of conversation on Saturday afternoon. "Usually," declared Mr. Lawrie Trewby (the Engineer and General Manager), "after an operation one is very much better;

and I can assure you that after last year we are very much better at Mill Hill. I would not, and neither would Mr. Pearce, willingly go back to the old ways. The men are more contented, and are doing better work; and it is all due, I think, to co-partnership. Though the scheme has only been going some seven or eight months, it has already done wonders; and I hope it will work more wonders still."

This co-partnership scheme owes its inception to Mr. A. M. Paddon, the Chairman of the Company, upon whose own ideas it is based. It is on rather unusual lines, inasmuch as it does not depend upon wages. The co-partners as a whole receive one-tenth of everything that is paid away to the share and debenture holders as dividend or interest; and this is divided among them all in equal proportions. That is to say, every man from top to bottom gets precisely the same amount. Thus, the fewer men there are, the bigger the bonus per man; so that, in addition to its stimulating effect upon the efforts of the employees, the scheme operates as an inducement to all to keep down the number of persons engaged by the Company. There is a Co-Partnership Committee, who are solely responsible for everything that is done. Before a man can become a co-partner, he must have been six months in the Company's service; and then he has to be approved by the Committee. The money is invested in the Company's shares, and anyone leaving the service is obliged to sell his shares to the other co-partners; he cannot remain a shareholder after he has left. In this way the fund never gets less. The scheme was made retrospective to Jan. 1 last year, and the bonus for the first twelve months has been paid. In addition to this, the Company's servants themselves have already put into the fund £700 of their own savings; and this sum is being rapidly added to by the weekly-wage men. At the meeting of shareholders of the Company, a few days ago, Mr. Paddon was emphatic in his approval of the results attained by the scheme.

To return, however, to Saturday's visit. On arrival, the eighty or more members of the Association who found themselves able to journey to Mill Hill were met by Mr. Trewby, Mr. Pearce, and other members of the staff; and no time was lost making a start on the tour of inspection, in the course of which it was noted that coal is brought into the works from the Great Northern Railway along a private siding, unloaded direct into the breaker from an overhead railway, and afterwards elevated and distributed in bunkers of 150 tons capacity. A crane with a grab working on a gantry deals with stock coal. The carbonizing plant consists of nine beds of ten, 20 ft. long by 24 in. by 16 in.; coal being placed in the retorts by means of a Guest-Gibbons charging machine or a Fiddes-Aldridge charger. The hot coke is removed by a telpher, quenched in a tank outside the retort-house, and tipped on the heap. A second telpher, provided with a grab, is used for loading coke-trucks on the siding. Though coal gas of 600 B.Th.U. is being produced, the stuff on the coke heap—more like breeze than coke—showed that this is being done with very rubbishy coal. The whole of the retort-house machinery is electrically driven; and there are motors in other parts of the works. A point about this is that all the motors are of the same size, so that they are interchangeable. The gas, on leaving the retort-house, is cooled by two water-tube condensers worked in series, and passes thence through the exhausters, Livesey washer, scrubbers, and dry purification plant to the holders.

The water-gas plant comprises three sets erected by Messrs. Humphreys and Glasgow, two of them having a capacity of 500,000 c.ft. per day, and the third of 900,000 c.ft. per day of blue gas. Oil is used only when necessary; and the mixture of coal gas and water gas is so arranged as to send out as nearly as possible 450 B.Th.U. gas. The gas is drawn from the relief holder through a Pelouze tar-extractor and oxide purifiers, and thence to the holders, on the inlet of which it is mixed with the coal gas. The electric generating plant consists of dynamos driven by Browett-Lindley compound enclosed steam-engines in duplicate, generating current at 220 volts. The Company also take a high-tension supply at 2800 volts from the local company, and this, transformed to 415 volts, drives a motor generator producing current at 220 volts. This was installed during the war, owing to the urgent necessity of economizing steam. A new blower for the large water-gas set is electrically driven by a 50-H.P. motor.

The whole of the exhausting plant, blowers, boosters, electrical generating plant, pumps, &c., has been arranged in a central engine-room immediately adjoining the boiler-house, so that all this machinery is looked after by one man. This is the house which was just being completed at the time of the last visit; and its excellent arrangement was commented upon by the visitors. All the exhaust steam from the engine-room is drawn through an evaporating condenser, and a vacuum of about 25 in. mercury is maintained. The condensed water is returned to the boiler feed tanks.

For wet purification, there are a 2 million c.ft. per day Livesey washer, two tower scrubbers, and a 2 million c.ft. Holmes rotary washer. For dry coal-gas purification there are four 40 ft. by 30 ft. boxes (with Milbourne's patent valves, and 24 in. connections), filled with "Climax" grids. For water gas there are three 20 ft. square, two 20 ft. square, and one 28 ft. by 20 ft. purifiers, which are worked in parallel in two sets of three. The water-gas purifiers are so connected that either part or the whole of them can, if desired, be used for coal gas. A good deal of interest was taken in an oxide breaker stationed in the purifier-shed, which is driven by an electric motor. The breaker runs along the shed on rails; and the oxide, which on coming out of the boxes is in a lumpy condition, is thrown into the machine by hand, through which a current of air passes during the breaking-up process. Then, with a little watering, the oxide is ready to go into the purifiers again. The machine has been in use a considerable time, and has given great satisfaction—the resultant saving in labour being very marked. One thing to be noted is that damp oxide quickly blocks-up the machine.

In addition to the water-gas relief holder, there are three storage holders on the works. The coal gas is first washed with oil in a Holmes rotary washer for the recovery of benzole; the oil afterwards being treated in a plant constructed during the war out of odd material found on the works. All the Company's lorries and cars are run on benzole produced in this manner. The sulphate plant has a capacity of 2 tons per day, and is provided with drying and neutralizing apparatus. The plant is worked in three shifts; and the sulphate is put up in 2 cwt. bags, so that it is possible to tell exactly how much each man makes. Attention was drawn here to the small plant for the production of household ammonia. In this plant a 10-p.ct. liquid ammonia is produced, for which there is a very considerable sale in the Company's district, at the price of 6d. per pint. Some time was also spent in the machine-tool shop, where, it was explained, the Company, having secured the right men for the purpose, do all their own repairs; and, in passing, members noted at the box, placed in a prominent position, to receive suggestions from employees that may lead to the securing of more efficient working results—and for which suggestions prizes are offered.

---

After the inspection, the visitors were taken in the Company's lorries to the King Edward's Hall, Finchley, where they were entertained by the Directors at tea.

Mr. Trewby remarked that when he told his Chairman, Mr. Paddon, that the members of the Association were coming down to the works, he said how pleased he was, and he paid the compliment to him (Mr. Trewby) of adding that he thought the works were worth seeing. Then he said: "Be sure you give them a good tea afterwards." [Laughter.] There was not after all, perhaps, very much to show them at Mill Hill. To some of them, 606 B.Th.U. gas might be unusual; but the Company were making it for a purpose. He did not recommend that it should always be done; but he wished to save oil, and he also wanted to get his coke heap—or breeze heap—down. The works had not been specially cleaned-up for the occasion. They were clean now, but he hoped before long to have them cleaner still. They were making a very large quantity of water gas at Mill Hill. At the present moment they were turning out 62 p ct. of water gas; and in view of the Carbon Monoxide Inquiry, he supposed they might some day be rather penalized for this, because they would easily exceed the 20 p.ct. of carbon monoxide which was suggested. At the same time, he must admit that they had not lost many of their consumers recently by poisoning. [Laughter.] He was gratified at the honour they had done him in visiting the works. No other Association had been over them since they were last there. If in a few years' time they cared to come again, he would be only too pleased to show them what there might then be to see.

Mr. F. A. Frost said he would like to express the pleasure they all felt at having again been afforded an opportunity of visiting the Mill Hill works. There was abundant evidence that a great deal had been done in the way of reconstruction and extension of plant in the seven years that had elapsed since their last visit. To him one of the most interesting features of the works had been the building in which the power plant was assembled. It was clear from what was to be seen there that the engineering staff needed to be taught no lessons in the means to be adopted for the conservation of steam. The condition of all the apparatus in this building was highly creditable to those concerned. The works were equipped to a much greater degree than works of that size usually were with mechanical and labour-saving devices, which must result in producing gas more efficiently than would otherwise be the case. They were much indebted to the Company for the privilege they had enjoyed; and he would like to ask Mr. Trewby to assure Mr. Paddon that they had had a good tea. He proposed a hearty vote of thanks to the Company, to Mr. Trewby, and to the assistants who had shown them round.

Mr. S. B. Chandler, in seconding, remarked that a better works for its size would be hard to find. It ought to be placed on record that the North Middlesex Gas Company had gone through a very painful period in its history—he referred, of course, to the strike—and it said much for the ingenuity of Mr. Trewby and their highly-esteemed President, Mr. Pearce, that the difficulties, which at the time must have appeared almost insurmountable, had been overcome.

Mr. D. C. Cross supported the vote, which was carried.

Mr. Trewby, in returning thanks, declared that what had been said with regard to the President and the works was not at all too much. Mr. Pearce had been his right-hand man, and had carried on the works as he wished to see them carried on.

---

**Committee on Factory Lighting.**—The Departmental (Home Office) Committee on Lighting of Factories and Workshops have now resumed their investigations. The Committee's work was temporarily abandoned (after the publication of the first report in 1915) owing to the war. They will for the present restrict their inquiries to the following points: (1) The conditions necessary to secure suitable lighting in factories and workshops; and (2) the effects of mixed natural and artificial lighting, with special reference to the lighting of underground workrooms. The Secretaries to the Committee are: Mr. J. W. T. Walsh, M.A., M.Sc. (of the National Physical Laboratory, Teddington), and Mr. H. C. Weston (Investigator to the Industrial Fatigue Research Board), to whom communications should be addressed at the offices of the Board, No. 6, John Street, Adelphi, W.C. 2.

# THE COMPOSITION OF COAL GAS IN RELATION TO ITS UTILIZATION.

By Professor R. V. WHEELER, of the Department of Applied Science, University of Sheffield.

**[A Lecture to the Sheffield Gas Consumers' Association.]**

My subject to-night is "The Composition of Coal Gas in Relation to its Utilization." There are two main questions that I propose to try to answer: (1) Within what limits do variations in the proportions of the combustible constituents in coal gas affect its behaviour on burning; and (2) what is the effect of the incombustible constituents?

By "coal gas" I mean the commodity which used to be termed "illuminating gas," and now that this term is inappropriate is perhaps best termed "town's gas," inasmuch as it may be a blend of coal gas, water gas, and coke-oven gas in various proportions. It is this fact, that the blending of widely dissimilar mixtures of combustible gases may be supplied by a gas company, and that the blend may, presumably, be varied from day to day provided that the calorific value of the mixture does not fall below a stipulated figure, that makes my first question a pertinent one.

Knowing as you do that the chemical and physical properties of the individual gases in town's gas are dissimilar—that, in particular, the manner of burning such gases as methane and hydrogen is different—you are no doubt anxious to know whether it is necessary or desirable that there should be rigid limits placed on any variation in the proportions of the three principal combustible gases in town's gas, methane, hydrogen, and carbon monoxide; or whether the more comfortable suggestion that is made by some gas engineers that "one B.Th.U. is as good as another"—a suggestion no chemist can accept without qualification—is sufficiently near the truth for all practical purposes.

I will not ask you to accept an opinion from me on this matter, or on the equally important one of the effect of incombustible gases—unsupported by evidence. No doubt the evidence that would appeal most forcibly to you would be a record of the results of comparative trials with different blends of gases in commercial apparatus. Such evidence is not at my disposal, nor at the disposal of anyone, or the question would not need to be debated. A little information is available regarding the behaviour of different qualities of gas for certain purposes—for incandescent mantle heating and for water boiling; and no doubt you are acquainted with that information. But as regards the effect of the composition of town's gas on its more general use (in furnaces, for example), we have no knowledge derived from practical trials.

I hope to be able to show you, however, how the behaviour of any mixture of gases can be deduced from a knowledge of the behaviour of the individual combustible gases. I propose to apply such deductions to the consideration of the behaviour: (1) Of different mixtures of coal gas and water gas; and (2) a straight coal gas to which different proportions of nitrogen have been added. These deductions have been rendered possible through the researches of Mr. W. Payman, M.Sc.(Tech.), who is one of the research students in the Department of Fuel Technology of this University.

Since there are so many factors, other than the chemical composition of the gas, concerned in the utilization of gaseous fuel, I must—in order that the effect of variation in chemical composition shall be readily apparent—assume certain standard conditions of utilization, and, in the first place at all events, assume that these standard conditions cannot be varied. The standard conditions I will assume, and I want you to bear this well in mind throughout all that I say to-night, are those necessary to obtain the maximum calorific effect with a bunsen burner in a given furnace.

You know that in a bunsen burner—which is the type of burner employed in most heating appliances—the gas is mixed with a certain amount of air ("primary" air) before it arrives at the mouth of the burner where it is burnt; the additional air ("secondary" air) required for the complete combustion of the gas being supplied there.

If you have examined the flame of a bunsen burner, you will realize that the combustion of the gas by primary and secondary air is readily divisible into two effects: The primary air is all used-up in the inner cone; and the excess of combustible gas is burnt as it comes into contact with the outer air, forming a sheath of flame around the inner cone. You are also familiar with the fact that the height of the inner cone is dependent upon the amount of primary aëration, and that, in general, the greater the amount of primary aëration that can be obtained (without the flame striking-back into the burner) the greater is the calorific intensity of the flame.

It is necessary for me to recall these commonplaces to your minds, because the proper appreciation of my arguments to-night depends on your realization of the fact that the character of a bunsen-burner flame is entirely dependent on the speed of propagation of flame in the mixture of gas and air that is issuing at the mouth of the burner; and my arguments are all based on knowledge of how this speed of propagation of flame varies with the composition of the mixture and with the nature of the combustible gases.

The speed of propagation of flame in mixtures of a combustible gas and air can be accurately determined in a variety of ways. One way is to measure carefully the cone of flame burning at the mouth of a tube like a bunsen-burner tube—the mixture of gas and air being carefully prepared in a holder, and fed to the burner at a constant rate, instead of the primary aëration being accomplished by the injector effect of the gas-jet. A more accurate and convenient method (that adopted for the experiments that I am going to describe to you) lies in measuring the rate at which flame travels in a mixture of known composition at rest within a long horizontal tube. When an inflammable mixture is contained within a horizontal tube closed at one end and open at the other, and is lighted at the open end, flame travels towards the closed end for a considerable distance at a uniform speed. This speed, under standard conditions of experiment, is a physical constant for any particular gaseous mixture. This is important, for the measurement of this speed enables one to characterize each different mixture.

As an example, I will show you a record of such measurements for all inflammable mixtures of methane and air. In fig. 1, the percentage of methane in air is plotted against the speed of flame under standard conditions—the so-called "uniform movement" of flame. Each of the circles in the diagram represents an actual determination; and you can see how, if a line is drawn through all the circles, a smooth curve is obtained from which the speed of flame in mixtures other than those actually experimented with can be read at a glance.

A graph of this kind gives a good index of the behaviour of a gas in an atmospheric bunsen burner. In such burners as are commonly employed in furnaces, gas-fires, heating-rings, &c., the

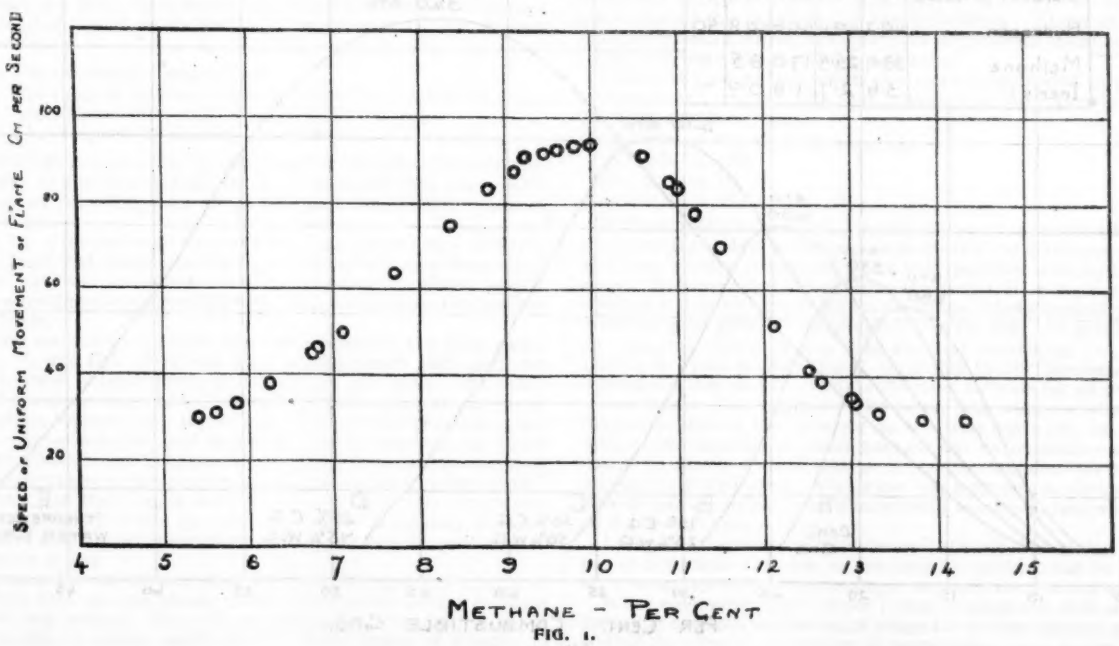



FIG. 1.

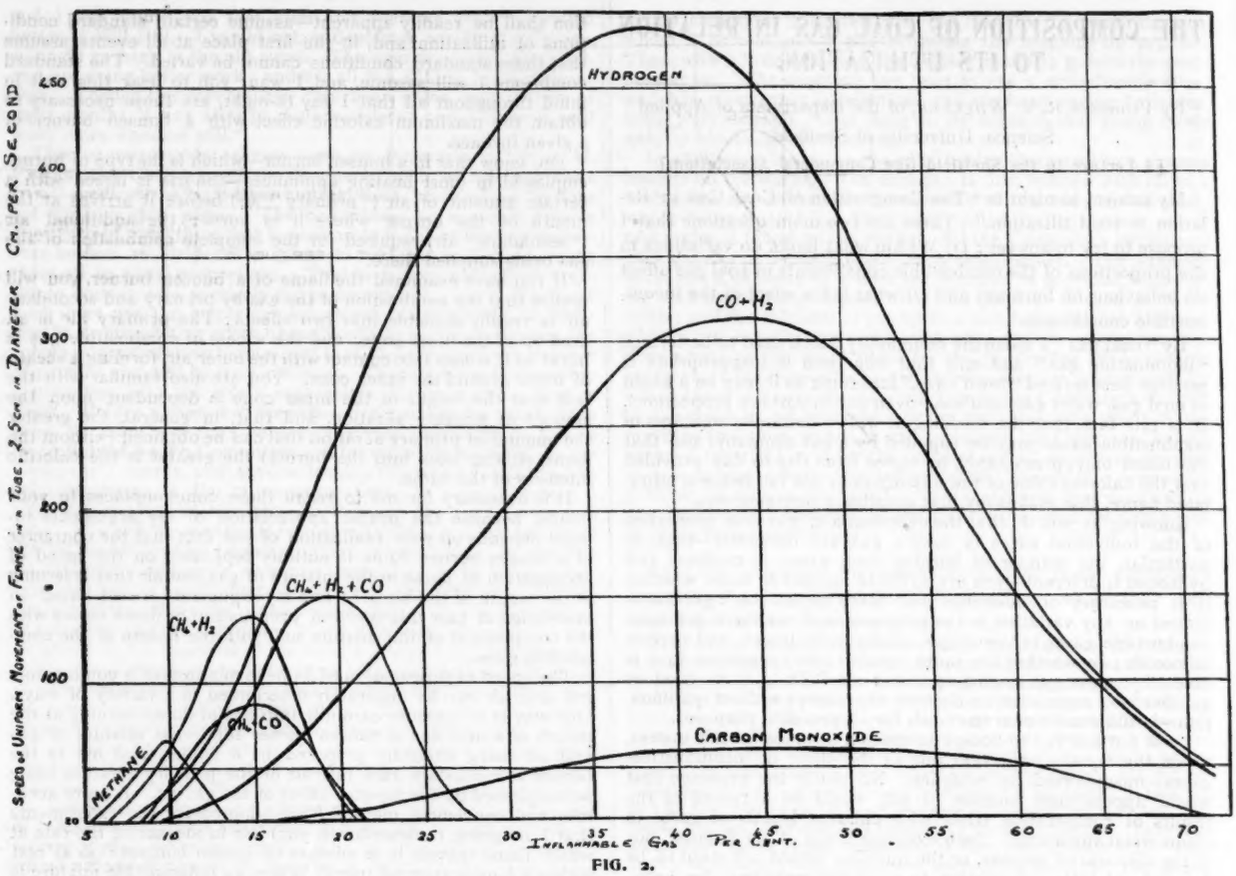



FIG. 2.

speed of propagation of flame in the mixture that issues at the mouth of the burner determines the character of the flame. The mixture is passing through the burner-tube at a speed dependent on the pressure of the gas; and you will understand that if flame can travel through the mixture at a faster speed than that at which the current of mixture is passing, the flame will strike-back into the burner. The maximum speed of flame that can be obtained with a given combustible gas and air—such as methane and air—gives, therefore, a measure of the tendency of that gas to back-fire.

If a number of different combustible gases are examined in the same way as methane, and speed percentage graphs are obtained from them, their relative tendencies to back-fire can be compared. Supposing that you are feeding a burner with pure methane at such a pressure that the speed of the current of gas and air at the mouth of the burner is (say) 50 cm. per second, it is clear that your primary aëration can be no more than that which will give a mixture of methane and air in which the speed of flame is not greater than 50 cm. per second. Such mixtures must, according to fig. 1, contain more than 12 p.ct. of methane. If you want to

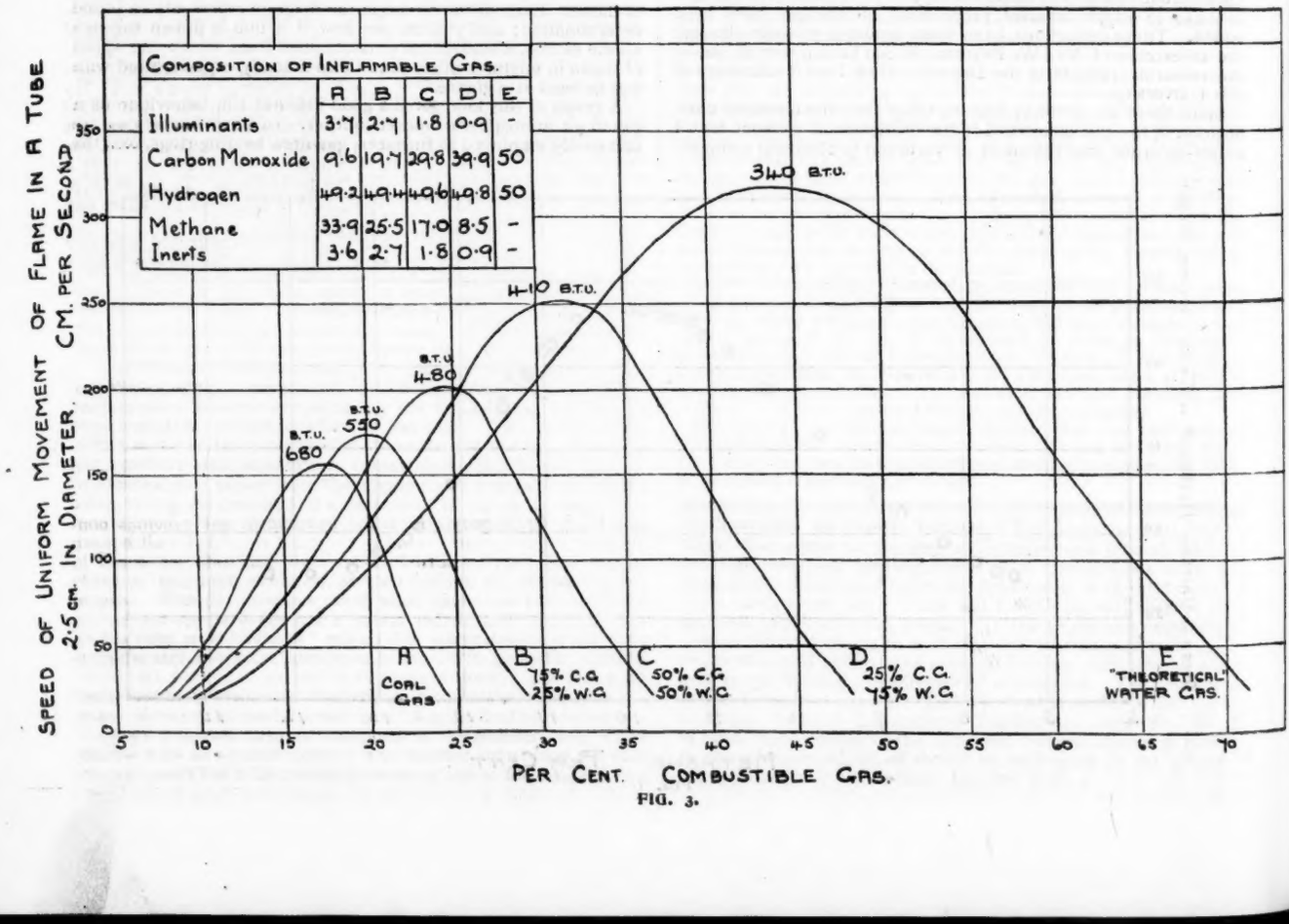
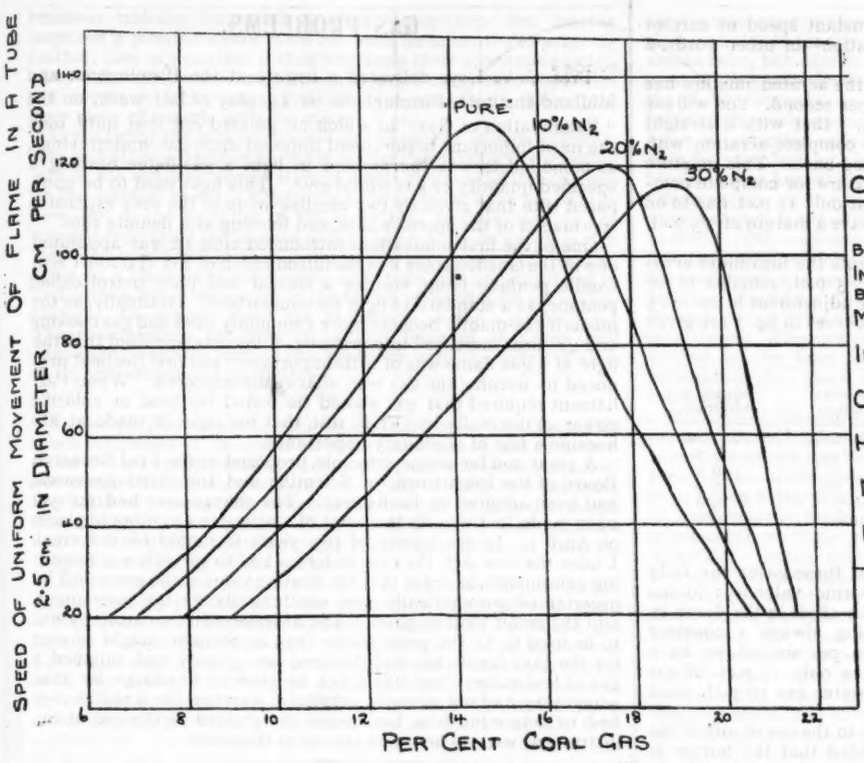

Composition of Inflamable Gas.
A B C D E
Illuminants 3·7 2·7 1·8 0·9 -
Carbon Monoxide 9·6 19·7 29·8 39·9 50
Hydrogen 49·2 49·4 49·6 49·8 50
Methane 33·9 25·5 17·0 8·5 -
Inerts 3·6 2·7 1·8 0·9 -
Speed of Uniform Movement of Flame in a Tube 2·5 cm. in Diameter. Cm. per Second
340 B.T.U.
410 B.T.U.
480 B.T.U.
550 B.T.U.
680 B.T.U.
A Coal Gas
B 75% C.G. 25% W.G.
C 50% C.G. 50% W.G.
D 25% C.G. 75% W.G.
E "Theoretical" Water Gas.
Per Cent. Combustible Gas.

FIG. 3.




| COMPOSITION OF INFLAMMABLE GAS | PURE | 10% $N_2$ | 20% $N_2$ | 30% $N_2$ |
|---|---|---|---|---|
| B.T.U. PER CUB. FT. INFLAMMABLE GAS | 760 | 680 | 610 | 530 |
| B.T.U. PER CUB. FT. MAX. CAL. AIR MIXTURE | 103 | 101 | 99 | 94 |
| ILLUMINANTS | 5·8 | 5·2 | 4·6 | 4·0 |
| CARBON MONOXIDE | 10·0 | 9·0 | 8·0 | 7·0 |
| HYDROGEN | 38·8 | 34·9 | 31·0 | 27·2 |
| METHANE | 45·4 | 40·9 | 36·4 | 31·8 |
| NITROGEN | — | 10·0 | 20·0 | 30·0 |

FIG. 4.

get nearer to complete primary aëration—the mixture for complete combustion, 9·45 p.ct. of methane—you must increase the pressure of the gas sufficiently to cause a current of gas-air mixture of at least 100 cm. per second.

The important part of such a graph as that shown in fig. 1 is, therefore, from our point of view, the portion which records the speed of flame in mixtures lying between the mixture for complete combustion and the "upper limit" mixture. This latter is the mixture containing the largest percentage of inflammable gas that will propagate flame at all. Any mixture containing more inflammable gas than in the upper-limit mixture—14·3 p.ct. with methane—would not maintain a bunsen flame at the mouth of the burner, but would rely mainly on secondary air for its combustion.

From the magnitude of the range of mixtures lying between the "fastest speed" mixture and the "upper limit" you obtain a measure of the "adjustability" of the gas—*i.e.*, the amount of variation that can occur in the proportions of gas and air produced at the primary mixing that will enable a bunsen flame to be produced, and will not allow the flame to strike-back.

Finally, from the steepness of slope of this speed percentage curve on the high-limit side, you can gauge what speed of gas-air mixture—*i.e.*, what pressure of gas—will enable you to obtain the maximum degree of aëration consistent with regular working.

There are, then, three points regarding these speed percentage curves, that should be noticed as of importance for our present discussion:

(1) The maximum speed of flame.
(2) The range of inflammability between the mixture of complete combustion and the upper limit mixture.
(3) The steepness of slope of the latter part of the curve.

I will ask you now, having considered in some detail the characteristics of the methane-air curve, to compare that curve with the speed percentage curves of the other combustible gases in town's gas.

In fig. 2, the methane-air curve has been plotted on a different scale from that shown previously, and the speeds were determined under different conditions; the object being to obtain results that were directly comparable with those for hydrogen and carbon monoxide.

I will ask you to consider first the curves for the pure gases, $CH_4$, $H_2$, and CO. You will see that, compared with methane, the limits of inflammability of CO and $H_2$ are wide. The maximum speeds of flame of CO-air and $CH_4$-air mixtures are about the same, whereas with $H_2$ the speed is about eight times as great. As we have seen, the most important part of these curves, so far as the utilization of the gases in burners for furnaces is concerned, is the character of the portion lying between the "fastest-speed" mixture and the "upper-limit" mixture; since this determines the adaptability of the gas and the degree of primary aëration possible with a given speed of current of mixture—*i.e.*, with a given pressure of gas.

Assume for the moment that the maximum speed of current of mixture that you can obtain at the mouth of the burner is about 50 cm. per second. You will see you ought, according to fig. 2, to be able to obtain nearly the maximum degree of aëration of methane without the flame striking-back; so also with CO; but that with hydrogen hardly any primary air at all can be present. So, also, regarding the range of mixtures lying between the fastest-speed mixture and the upper-limit mixture, this is:

Between 10 and 14 for $CH_4$ = 4 p.ct.
" 50 " 70 " CO = 20 "

while with hydrogen there is hardly any margin at all.

So we learn from these curves that for a given pressure of gas at the burner the use of $CH_4$ alone would enable you to have a high degree of primary aëration but would give you but a small range of adjustment. The use of CO alone would also allow of a high degree of primary aëration without the flame striking-back, and would give you a wide range of adjustment of the primary air; and the use of hydrogen alone would place you in difficulties as regards striking-back. Hardly any primary aëration could be used, and so you could not obtain a high degree of calorific intensity.

You do not want to use these gases alone. You are only concerned with them as they are mixed together in town's gas. My reason for describing the behaviour of flame in each individual gas is that they preserve their characteristics when they are mixed together, and that it is possible to calculate what the behaviour of any mixture of combustible gases will be from a knowledge of the behaviour of the individuals. These calculations have been checked by experiment in numerous instances and found to agree with remarkable accuracy.

Before we pass on to consider the more complicated mixtures of town's gas, I would call your attention to the curves in fig. 2 for fairly simple mixtures:

(i.) $CO + H_2$, which is water gas.
(ii.) $CO + CH_4$
(iii.) $CH_4 + H_2$
(iv.) $CH_4 + H_2 + CO$.

Without going into details, I would ask you to note the effect of mixing methane with hydrogen—how greatly the maximum speed with any mixture is reduced from that possible with hydrogen alone. Note also that the addition of CO to $CH_4 + H_2$ has little effect on the speed; but it widens the range of inflammability, and therefore gives greater "adaptability" to the gas. In general, of the mixtures shown in this diagram, that containing CO, $CH_4$, and $H_2$, in equal proportions, is, according to our previous considerations, that which would be the most suitable for all bunsen burner work. You will realize, however, that wide variations in the proportions of the different combustible gases can be made without fear that the resultant mixture will be unusable—except that it is clearly a disadvantage if the gas contains too high a proportion of hydrogen. Water gas, for example, is obviously a difficult gas to control in an atmospheric burner—a fact which is no doubt well known to you.

I propose, therefore, to consider now the effect of adding water gas to a straight coal gas, to see how far addition can be made without serious difficulties arising in the utilization of the gas.

When comparing these curves I must remind you that we are assuming constant conditions of usage for all the different gases; so that the effect of differences in composition may be the more

readily apparent. We will assume a constant speed of current gas-air mixture attained by primary aëration—in other words, a constant pressure of gas.

Assume that the pressure is such that the aërated mixture has a speed at the burner mouth of 150 cm. per second. You will see from a comparison of the curves in fig. 3 that with a straight coal gas you should be able to get nearly complete aëration with primary air without the mixture striking-back. This mixture would contain 19 p.ct. of gas; and the mixture for complete combustion contains 17·5 p.ct. of gas. So that only 1½ p.ct. has to be burnt with secondary air. Further, you have a margin of 5·5 p.ct. of gas (*i.e.*, 24·5 − 19·0) for adjustment.

With Curve B, 22·5 p.ct. of gas represents the maximum aëration you can have; so that 22·5 − 20·0 = 2·5 p.ct. remains to be burnt by secondary air. Your margin for adjustment is 29 − 22·5 = 6·5. Similar calculations for the other curves in fig. 3 are given in the table that follows

| | Maximum Primary Aëration. | Secondary Aëration. | Margin for Adjustment. |
|---|---|---|---|
| | P.Ct. Gas. | P.Ct. Gas. | P.Ct. Gas. |
| Curve A. . . . . | 19·0 | 1·5 | 5·5 |
| Curve B. . . . . | 22·5 | 2·5 | 6·5 |
| Curve C. . . . . | 28·5 | 4·0 | 8·0 |
| Curve D. . . . . | 39·5 | 7·5 | 9·0 |
| Curve E. . . . . | 61·0 | 16·0 | 10·0 |

I need not remind you that with each of these gases the fully aërated mixture has about the same calorific value—95 to 100 B.Th.U. The distribution of the calorific effect in the flame is, however, clearly very different. Assuming always a constant speed of mixture at the burner of 150 cm. per second, we have seen that, whereas with straight coal gas only 1½ p.ct. of gas requires burning by secondary air, with water gas 16 p.ct. must be so burnt.

There can, however, be no disadvantage in the use of any of the gases for purely heating purposes, provided that the burner is sufficiently adaptable and the pressure of either gas or air, or both, can be controlled. Assuming the latter adjustment to be impossible, and the apparatus to have been designed for straight coal gas, I should say Curve C (50 p.ct. coal gas and 50 p.ct. water gas) represents about the limit of addition of water gas that would be readily serviceable. Such a gas as is represented in Curve C (see analysis) is, in fact, a very serviceable gas, despite its low calorific value. Even gas as Curve D has not much to militate against it.

In general, then, I see no reason, on the score of an adaptable mixture of the gas, for trying to place limits on the proportions of the combustible gases present. The variations in the proportions that can be obtained by blending coal gas, coke-oven gas, and water gas are not such as to cause any difficulty in the utilization of the resulting mixture. If a limit is to be placed on the proportion of any one of the combustible gases, it should be placed on the hydrogen.

To come now to the effect of incombustible gases. Here again—as will be seen on an examination of the table in fig. 4—the calorific value of the fully aërated mixture is not affected very much even by such a high proportion as 30 p.ct. of incombustible gases. Any difficulty that there may be in utilizing such poor gas must lie, therefore, in what may be termed its reliability. Does a high proportion of nitrogen adversely affect the ease of adjustment of the gas-air mixture? The answer is that it does, and on this score alone the presence of a high proportion of incombustibles in a gas to be used in burners of the bunsen type should be avoided. The adverse effect of the presence of nitrogen on the adaptability of the gas is shown in fig. 4, and is at once apparent from the steepness of the curves on the high-limit side.

Translating into figures showing the margin for adjustment expressed as percentages of gas, these are:

| | Margin for Adjustment P.Ct. Gas. |
|---|---|
| Pure coal gas . . . . . | 5·5 |
| Coal gas with 10 p.ct. of nitrogen. . . . . | 4·6 |
| " " 20 " " . . . . . | 3·6 |
| " " 30 " " . . . . . | 2·6 |

You will realize that a small margin for "adjustment" means that slight variations in pressure of the gas will cause wide fluctuations in the character of the flame and in the distribution of heat throughout it, with consequent inefficiency of the furnace.

---

**Utilization of Oil Shales.**—The "Technical Review" states that, in "Stahl und Eisen," Dr. R. Metzger, of the Stuttgart Gas-Works Laboratory, gives a brief geological and chemical description of the oil-shale deposits at Württemburg, and suggests possible lines of development, at the same time furnishing an account of what has already been accomplished. The possible fields are: Utilization of bitumen by distillation, gasification, or combustion, and use of the resultant slag or residue for cement manfacture, and for making artificial bricks and fertilizers. The greatest prospect of success is by utilizing the calorific power of the bitumen in large gas-producers, where, by using 30 to 35 p.ct. of the heat latent in the shale, 65 to 70 p.ct. of it can be recovered in the form of gas and oil. Unfortunately, no suitable procedure exists at present for treating the oil-shale."

## GAS PROBLEMS.

Prof. C. V. Boys delivered a lecture at the Birmingham and Midland Institute, Birmingham, on Tuesday of last week, on the "Examination of Gas," in which he pointed out that until 1906 the most important requirement imposed upon gas undertakings, as monopolists, was the amount of light a gas-flame burning a specified quantity of gas would give. This light used to be compared with that given by two candles made of the very expensive spermaceti of the sperm whale, and burning at a definite rate.

One of the first innovations introduced after he was appointed one of the Gas Referees was the introduction of the Harcourt ten-candle pentane lamp, burning a special and pure petrol called pentane, as a standard of light for comparison. Gradually, as the modern gas-mantle became more commonly used and gas cooking and gas-fires increased in popularity, it became apparent that the light of a gas-flame was of little importance, and that the heat produced by burning the gas was what really mattered. When Parliament required that gas should be tested for heat or calorific power as the really important test, that for light (if made at all) became a test of secondary importance.

A great and far-seeing principle, proposed by the Fuel Research Board of the Department of Scientific and Industrial Research, had been adopted by Parliament. The change-over had not yet been made, but was on the point of starting in a number of places on April 1. In the course of two years it should be universal. Under the new Act, the Gas Referees had to prescribe a recording calorimeter, in order that the heating value of the gas could be ascertained automatically and continuously by the instrument, and the result written-down. The average result so attained was to be used to fix the price which the gas company might charge for the gas; for if they had declared one quality and supplied a gas of less value, they would not be allowed to charge for that which they had not actually supplied. Further, the Gas Referees had to determine how the results ascertained by the use of the instrument were to be made known to the public.

## SCOTTISH JUNIOR GAS ASSOCIATION
### (WESTERN DISTRICT).

There was a fairly good attendance of members of the Association last Saturday evening, when Mr. S. H. Hunter, Superintendent of the Milan Street workshops of the Glasgow Corporation Gas Department, read a suggestive paper on the "Selling Side of the Gas Industry." Mr. James Jamieson (the President) was in the chair.

### THE SELLING SIDE OF THE GAS INDUSTRY.

By S. H. Hunter.

In common with other industries, gas undertakings find themselves at a critical period in their history, when improvements in the manner in which they carry out their obligations have to be made. The old system between buyer and seller of "have it or leave it" no longer applies to the goods we sell. From various sources there has arisen an insistent demand for such better organization as would give improved service to the community and create in them greater confidence in the goods we have for sale. Whether we like it or not, we have to recognize this new force and adapt ourselves to conditions that are as inevitable as the evolution and progress of mankind. It would be well for us to ask ourselves what steps we are able to take to meet this new demand if our future endeavours are to be of mutual profit to our customers and ourselves.

In all transactions where goods change hands there are three prime factors—the seller, the buyer, and the goods. The relationship of these three comprises the principles of the law of sale. I propose to examine them in their application to our industry, for the purpose of obtaining a correct perspective of our goods and their value to ourselves and our customers; then of ourselves and our customers in the service of our goods; then of our customers and their value to us in the purchase of our goods.

#### The Standard of Salesmanship.

For years I have been studying the selling staff of the industry, and have found very few men who, in my opinion, approach the standard of salesmanship one finds in other branches of commercial life. The average gas salesman does not really appreciate the fact that he is a salesman. His supervisory duties and routine work have always occupied most of his time. He regards the search for new business as more or less apart from his duties, and his title—that of inspector—suggests to the consumer that his actions are more in favour of his employers than themselves. Whether he and his colleagues or the distribution staff of the gas industry realize it or not, they are the salesmen in the truest sense of the word; and it is unfortunate, both for the undertaking employing them and the consumers they serve, that this staff has in past times received little or no encouragement to develop itself on the lines of scientific salesmanship. Engineers, fitters, clerks, and others, who originally were employed as such, and showed outstanding ability in their particular branch of the business have been appointed the supervisors of other men who have progressed less than themselves. Length of service and ability in handling distribution problems, irrespective of their

business training, have led to their promotion. But having acquired a position where there has been no incentive to progress further, they are content if they can keep their consumers quiet, carry out such routine instructions as come their way, cope with the supply in fitting any appliances the consumers order, and keep clear of trouble with the office.

Considering the lack of interest on the part of Boards of Directors and other governing bodies in matters pertaining to the selling side of the industry, such a state of affairs can only be looked upon as the natural result. Efforts for improvement have practically been left to the initiative of the individual himself; and as the average individual in the case under review is by no means a rich man—he would not be there from choice if he was—and, furthermore, as a class he is notoriously underpaid, it is not surprising to find some glaring anomalies in the selling staffs of different undertakings. Of course, there are exceptions to the average type. These exceptions are men of natural force of character and education; and it is men of this type who keep the industry alive to its obligations and possibilities.

### THE BUYER.

I now purpose a short analysis of the buyer. He is just as much interested in the goods as are we, the sellers, and must perforce of his requirements avail himself of our services or those of our competitors to obtain them. It would be difficult to conceive any state of animate life where services such as we perform are unnecessary or unwelcome. Such a field of possibilities could be analyzed as would, by its immensity, give confidence to the most despondent member of the selling staff.

The buyer, however, is uneducated in the value of our goods, and is possibly prejudiced. Our competitors may have obtained a hold over him. There are a dozen reasons why he should not love us—more often than not our neglect of him is the cause. Comparatively speaking, he is as uneducated in his requirements as is the selling staff in their duties to him. The first need in an attempt to procure such improvements as would constitute a scientific interpretation of the principles of the law of sale is to understand the qualities that make our goods valuable, and to apply such knowledge so that the high standard we claim is maintained. We still claim all the advantages of cheapness, uniformity, and standard; but recent experience of our goods in their manufacture shows that the producing side of our industry is out of harmony with itself, for it has not yet been decided what actually constitutes the standard of gas itself. The thermal quality and the pressure are undetermined quantities; standardization of fittings and appliances is still undecided.

These are a few of the defects in our goods which must be remedied before the gas salesman can possess the confidence necessary to enable him to transfer his confidence to the buyer. We must assume that these faults will be remedied, and our goods placed above reproach in the near future. Failing a common standard, an undertaking should maintain its own standard. Whatever thermal value is claimed and pressure declared, these should be adhered to, and made known to the selling staff. Should variation be found necessary, information should be immediately passed on to the selling staff, and, in the case of large undertakings, be advertised in the local Press.

### THE "B.C.G.A." AND SELLING STAFFS.

Having reached the stage where our goods are all that we claim them to be, we are now justified in looking for better organization in the selling staff. How are we going to effect improvements? The increased demand for our goods, the sterling value of which was their own advertisement, helped to defer the need for the expert salesman till the times when improvements in the methods of our competitors had the effect of awakening us to the need for reorganization and better training of our selling staffs. The governing senior councils of the industry soon recognized the need for commercial improvement, and, by financing and supporting the British Commercial Gas Association, paved the way to uniformity. Up to the present time this body has developed on the lines of a great publicity department. This it has done so well that it has only emphasized the state of unpreparedness on the part of the selling staff, whose weaknesses have become so manifest that the "B.C.G.A." is now turning attention to the necessity of educating the commercial side of the industry. Up till now the scheme put forward is only in its infancy. But undeveloped as it may be, it proves the need for prompt response by the selling staffs. For if the many past achievements of the "B.C.G.A." are taken as an index of its thoroughness in obtaining the results it sets itself to attain, we may be sure that the scheme, when fully developed and generally adopted, will do much to reduce the inefficiency at present rampant in our commercial departments. The propositions that the "B.C.G.A." Sales Organization Scheme sets forth in its syllabus for the elimination of wasted energy, with the suggested opportunities it presents for the mutual interchange of the lessons learned in the fields of various endeavour, are of such valuable service to the industry that only the most retrograde of undertakings will fail to accept its assistance. The inevitable consequence of a general adoption of the "B.C.G.A." proposals will establish a standard of excellence required of the selling side of the industry. This standard will be far beyond that at present aspired to by the existing staffs.

### SCIENTIFIC SALESMANSHIP.

The object of my analysis was to prove that it was only necessary to concentrate attention on the three factors comprising the elements of sale for the purpose not only of finding where weaknesses exist, but also to narrow the field of reform. As in the case of the goods, the knowledge of their shortcomings points out the obvious remedy, so, in the case of the seller, a concise knowledge of his weakness compared with the best standard of excellence in scientific salesmanship makes it easy to determine the path he must follow. It would be as well to state what is meant by this "best known standard of excellence?" I define scientific salesmanship as the arranging of the transfer of goods or services between buyer and seller under conditions of mutual profit to both. The scientific salesman, therefore, is one who himself possesses such a knowledge of his goods (or his undertaking) and his customer as is necessary to complete this arrangement. His training, therefore, must be a study of each of these three factors. It is here that the reorganization of the selling staffs must begin. The existing staffs must apply themselves to become perfect in the knowledge of these elements of sale, or as an alternative, give place to others who will possess the necessary knowledge.

Fortunately or unfortunately, according to the viewpoint of the owners of the undertakings or their present selling staffs, this latter alternative has not yet made its appearance. There is yet time for the existing staffs to acquire proficiency. No one knows their goods better than they. They hold the advantage of years of experience in the handling of them, so that it should need no super-effort on their part to keep abreast of the times in this direction. But in case "familiarity breeds contempt," a little research work occasionally, in a properly-equipped experimenting shop, might not be regarded altogether as a waste of time, for there could be determined beyond question the worth of new appliances, the manner in which defects may be dealt with, and numerous other matters pertaining to the maintenance of the best possible standard of the goods. I would recommend, in passing, that every undertaking should set up such an experimenting room, and place it freely at the disposal of its selling staff, granting generous time for research work to those who wish to take advantage of it. A healthy interest in the goods could be maintained by the periodical attendance of the selling staff at instructive and encouraging lectures, given by prominent men in the industry. As a matter of policy I consider it might well be a condition of service that each member of the staff spends a specified time at any lectures organized by his own undertaking. The time taken up in these lectures should not be burdensome. If it were, it would probably defeat the purpose for which the lectures were arranged.

Now because of the advantage they hold in the knowledge of their goods, the selling staffs are in the favourable state of being able to concentrate their endeavours for improvement in a close study of the two remaining elements of sale—viz., themselves and their customers; and as both are subject to the same emotions and aspirations, there exists a common bond of interest, which reduces the effort to a general study of human nature. The selling staff might concentrate on a study of physical and psychological man; for familiar knowledge of him and his needs will make it easy to approach him, to know what to offer him, how to explain it, how to claim his attention, hold his interest, anticipate and augment his desires, and direct his actions in such a manner that the goods will change hands under terms of the utmost confidence and satisfaction to both buyer and seller. In the best organized commercial circles in America, business training is considered incomplete unless this study of human character analysis has formed part of it; and there are now a few schools of business philosophy in Britain where it occupies a prominent position in their syllabus. It is to the educational matter furnished by such schools that for the present our selling staffs must turn to complete this most important item of their education.

There arises, of course, the question of finance. Speaking broadly, I think it would be too much to expect the present selling staffs to make an unaided attempt to work-out their own salvation, especially when we consider that the industry as a whole stands to profit by their advancement. In my opinion, as the industry stands to gain much, it is not bad logic to suggest that they should contribute largely toward the expense. Some gas undertakings have already moved in this direction; and their selling staffs have increased their value out of all proportion to the expense incurred in their training. This step in the right path, however, is limited to the efforts of a few brilliant and far-seeing managers. The example is encouraging, but insufficient. What is wanted is a properly drawn-up system of training common to the whole industry, fostered and financed by the various governing councils; and nothing short of this will meet the requirements.

I think it inevitable that the "B.C.G.A." will take the matter up; for as its propaganda proved the need for a flexible standardization of commercial routine and so brought into existence its Sales Organization Department, so the development of this latter will, having established itself a necessary adjunct to the administrative staffs, find it advisable to standardize the education of gas salesmen. Whatever educational scheme may be adopted, however, it should be drawn-up and worked in close co-operation with the recognized educational authorities. An industry of public service such as ours has every right to demand and obtain this recognition.

In referring to the possibility of the existing staffs failing to perfect themselves in their knowledge of the elements of sale, I mentioned as an alternative that they should give place to

others who possess the required knowledge, but qualified the statement by saying these others are not yet in existence. This will remain true until the governing councils of the industry, driven by sheer force of necessity, decide to establish business training schools, with or without the co-operation of the recognized educational authorities in the various parts of the country. I am convinced of the need of this being done at once; for whatever action may be taken in the direction of progress by the present gas selling staffs, the various vacancies created daily by the ordinary conditions of life might as well be filled up by men of ability, carefully educated and trained for the business, in preference to the next best man, however good he may be.

The business training school I have in mind would be so complete in its operations that it would discriminate as to whom it should apply its functions. It should have authority to select only those whom its standard of efficiency would adjudge to be (at least) possible salesmen, and, having made its selection, be entirely responsible for their training, until the students graduate and take over responsibilities in the selling staffs of the industry After this had occurred, the graduate should never be allowed to lose touch with the school. Business science circles could be formed under its supervision, reference libraries instituted, correspondence classes arranged, technical data supplied, and so on.

Some undertakings have seen the advantage of recruiting their selling staffs at the apprentice stage. There is everything to commend this; and I think it should be universal. It certainly would be necessary in an undertaking desirous of taking full advantage of the educational institution I have referred to, as the suggested selection of potential salesmen could be made at that time of their life when their minds are most plastic and susceptible to correct training. For such I would suggest a prescribed course somewhat on the following lines:

*Theoretical Training.*

From sixteen to eighteen years.—Commercial training, gas supply, and physical development.

From eighteen to twenty years.—System, character analysis, and gas distribution.

From twenty to twenty-two years.—Character analysis, and business philosophy.

Commercial training.—Gas supply and gas distribution as at present under existing educational authority.

Special courses of (1) physical development; (2) system; (3) character analysis; (4) business philosophy, for

(1) Obtaining control of the receptive senses, the retention and application of what has been learned.
(2) The methodical arranging in correct juxtaposition of everything learned or acquired in relation to the functions of the goods, the seller, and the buyer.
(3) The study of mankind; finding the characteristics of the various types and composites of types; how recognized and served.
(4) The scientific valuing and use of standardized methods for the purpose of getting together the three elements of sale under conditions of perpetual confidence.

*Practical Training.*

| Age. Years. | Time Occupied and Where. | Contact Study of | | |
|---|---|---|---|---|
| | | Goods. | Seller. | Buyer. |
| 16 | Six months various branches distribution stores . . . | Fittings, Appliances. | Distribution Staff. | *Nil.* |
| 16½ | Six months workshops . . | Do. | Do. | Do. |
| 17 | Three months mains and services department . . | Fittings. | Do. | Do. |
| | Nine months general fitting work . . . . . | Fittings, Appliances. | Do. | Consumers. |
| 18 | One year estimating . . . | Appliances, Costs. | Do. | Do. |
| 19 | One year distribution office. | Transport, Records. | Do. | Do. |
| 20 | One year commercial office. | Records, Advertising, Buying, Costs. | Commercial Staff. | *Nil.* |
| 21 | Showrooms. . . . . | Appliances. | Do. | Consumers. |

Qualifications required: Age not less than sixteen years; education, secondary school. Commence as an apprentice gas salesman for a period of not less than six years.

This syllabus by no means covers the whole course to be pursued, and is only offered as a suggestion as to how a start could be made.

In conclusion I want to read two extracts from the writings of two men whom I regard as knowing, in the first case, most of the requirements of this subject, and in the second case the manner in which they should be met. Mr. F. W. Goodenough says: "By selling gas we mean creating the demand for gas by persistent and adequate local publicity in all its many possible aspects, and by carefully planned and skilfully directed personal salesmanship." Mr. A. F. Sheldon says: "It has been said that all Nature's chiefest laws can be written upon the signet of a ring. It may be stated with equal force that all Nature's chiefest laws may be boiled-down to four injunctions: First, man know thyself; second, man know thy business; third, man know human nature; fourth, man apply the knowledge of self, human nature, and your business to the art or performance of the work of business building. The knowledge gained through a study of character analysis or natural law pertaining to the how of reading human nature is a most essential element in the power to make permanent and profitable patrons."

## DISCUSSION.

Mr. L. Fletcher (Glasgow) said he saw no particular reason for specializing salesmanship in the gas industry. It rather occurred to him that everyone ought to be a salesman, from the office boy to the general manager. To his mind, they ought not to wait until the consumers applied for information; rather should they volunteer all useful advice.

Mr. J. Wylie (Glasgow) said he was disposed to agree with the author that the potential salesman should be secured when young, and carefully grounded in the science of salesmanship. In his view, personality always counted in the long run; but the fact that a youth was trained for the post early in life did not necessarily mean that he was bound to be a success. More should be done by Associations like their own to inaugurate such training schemes as had been outlined by Mr. Hunter. The various Associations in the United Kingdom were not sufficiently alive to present-day possibilities. He felt they should inaugurate some sort of propaganda with the idea of boosting-up the various selling sides of the industry. He hoped at no far distant date the Junior Associations would be able to formulate a scheme that would be a guide to a young man in the gas industry who was full of enthusiasm, and possibly anxious to learn thoroughly the many different sides of the undertaking. The great essential of to-day was to make good and cheap gas. If this were done, then the rest might quite safely be left to the women folk.

Mr. M'Isaacs (Glasgow) said the author had represented the view that they did not concentrate sufficient time on the selling side of the gas industry, and had put forward the plea that no great improvement could be looked for until they produced a capable and efficient selling staff. Of course, the view was often taken by those in the manufacturing side of the business that they had sufficient worries without troubling their minds at all about the selling of gas. Frankly, he was rather in sympathy with the manufacturing side, because they had many difficulties to contend with. He considered the whole question of selling lay in the standard calorific value and pressure of the gas manufactured. If the calorific value and pressure were satisfactory, it was quite an easy matter after that to sell gas. On the question of training, he was inclined to take the view that salesmen were in reality born and not made.

Mr. Hogg said he was in sympathy with the observations made by one of the previous speakers that they should all be sellers of gas. The foreman as well as the fitter should be a judicious salesman. Often when he had gone to a house to do a necessary repair or fitting he had done his best to push new sales. Besides making certain that the job he had on hand was thoroughly well executed, he had made suggestions to the householder that some new idea should be tried. In many cases these hints were acted upon; and it sometimes involved more and greater business. In the matter of the maintenance of gas-fires, useful hints could be given to housewives. Thoroughness in workmanship was also an essential element that had to be kept in view when they were discussing the selling side of the gas industry. He made a point of leaving in a perfectly satisfactory condition every gas-fire he was repairing. This gave the householder confidence in the gas undertaking and encouraged the selling side. He agreed that they should endeavour to get the best possible type of salesman; but the good salesman was really born.

Mr. W. N. Patterson considered that the industry at the present day required good salesmen. It would be a mistake to eliminate the salesmanship side of the industry. Many managers took the view that scientific salesmanship was unnecessary because they had a demand for as much gas as they could manufacture. This was an erroneous impression altogether, because if they developed their business along the lines of scientific salesmanship managers might find they could double the size of their works and sell twice as much gas as before.

Remarks of a complimentary nature having been made by Messrs. George Keillor, jun., and Taylor,

Mr. James Dickson said he thought the scheme Mr. Hunter had outlined for the training of salesmen was somewhat elaborate. While agreeing with a great deal that the author had said in relation to the training of district men, he did not think this was of so much importance in the western district of Scotland, at all events.

Mr. James Cubie (Glasgow) agreed that Mr. Hunter had outlined a most valuable scheme. The drawback lay in this—that they might give all this scientific training to men who in the long run would turn out very indifferent salesmen. It would be of value if Mr. Hunter would more fully detail the lines on which he proposed the salesmen should work. No doubt the majority of large commercial undertakings made a feature of keeping the wares they sold under the notice of the public. Publicity in many directions was to be commended, and perhaps it was true to say that the gas industry had been a little conservative in its methods. He hoped, however, the author did not mean to infer that the gas industry would never make headway until every gas corporation or company adopted the scheme of the British Commercial Gas Association relative to sales organization. The real kernel of this question had been touched by one of the speakers who advocated a good quality of gas. After all, in this matter of salesmanship personality probably counted more than training.

Messrs. Urquhart, Macintyre, and the Chairman also joined in the discussion, which was closed with a brief reply from Mr. Hunter.

## Masonic.

The Secretary of the Northern Star Lodge, No. 3053 (W.Bro. Batt), reports that at the meeting on the 1st inst., at the Midland Hotel, Manchester, the S.W., W.Bro. R. H. Garlick, was installed Master of the lodge for the ensuing year. A collection made at the social board on behalf of the Ex-Service Soldiers Unemployment Fund realized the sum of £70, which was handed to the Manchester Branch of the fund.

## CORE-DRYING OVENS AT GREENOCK.

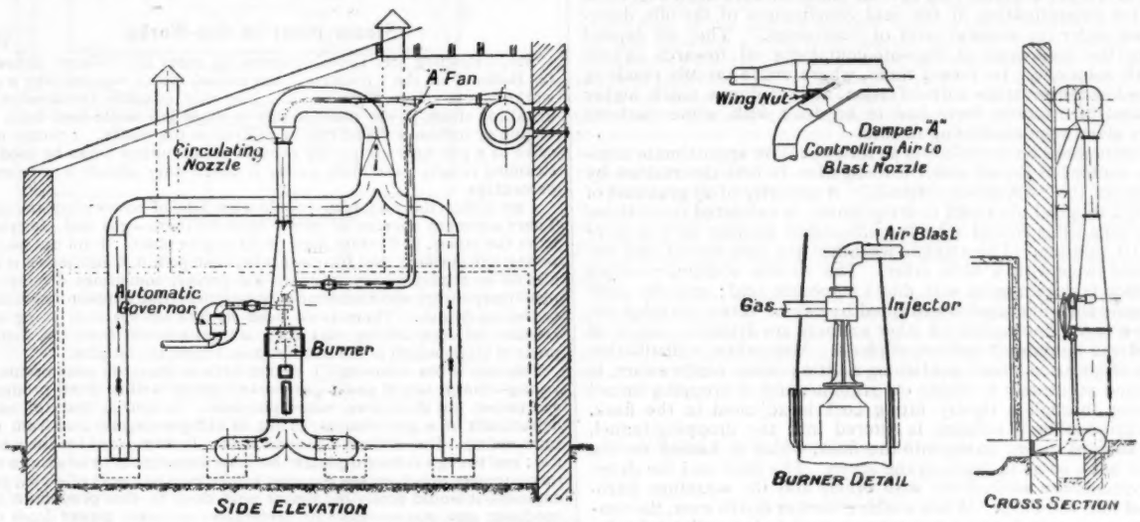
The accompanying drawings of the application of town gas to large core and mould drying ovens illustrate a system which has been evolved for this purpose by the Greenock Corporation Gas Department; and in sending them for publication, Mr. George Keillor, the Engineer and Manager, says it is the first installation of its kind in Great Britain, and is a thorough success. Excellent results are also obtainable with low-pressure burners.

Large and small cores and moulds are dried in the oven in about half the usual time. Owing to the perfect system of control, the heating may be retarded at the commencement, when the maximum of moisture is being expelled, and accelerated towards the end of the operation, when more heat can be applied without damage to the moulds. About 80 p.ct. of the waste heat is re-circulated. A thermograph enables the man in control to obtain the same heat conditions with every charge of the oven. Consequent upon the uniformity of heating and the cleanliness of the drying process, there is no expense in cleaning the dry moulds, and no scrapped castings.

Taking everything into account, the system is more satisfactory than existing methods; and the manager of the Caledonian Foundry, where the oven is in daily use, speaks in most flattering terms regarding its efficiency. Two large ovens are being similarly fitted for Messrs. Kincaid & Co., at their Arthur Street Foundry; and arrangements are being made to instal a portable gas-heater for the drying of very large moulds *in situ*. The system is also to be supplied experimentally to the ovens in M'Aulay's Bakery; and the results are expected to be highly satisfactory.

The Keith-Blackman Company, Ltd., have collaborated with the Greenock Gas Department in the design and application of the system; and much credit is due to them for their prompt and ready assistance.

It may be recalled that some reference was made to this matter by Mr. James Jamieson, of Greenock, in his Presidential Address to the Scottish Junior Gas Association (Western District), as reported in the "JOURNAL" for Nov. 10 last, pp. 334-5.




GAS-HEATED CORE-DRYING STOVE.

## PROCESSES OF HYDROGENATION.

The third and last of his series of Cantor Lectures on "Applications of Catalysis to Industrial Chemistry" was delivered by Dr. ERIC K. RIDEAL, M.B.E., M.A., F.I.C., before the Royal Society of Arts on Monday evening of last week; the subjects taken being processes of hydrogenation and hydrolytic processes.

The lecturer said that the recent growth in the demand for hydrogen in industry—such as for filling rigid airships for the synthesis of ammonia, for the hardening of oils, and in the fine chemical industry—has stimulated research in the problem of hydrogen manufacture. Theoretically, it should be more economical to manufacture hydrogen than blue water gas; but this has not yet been achieved. The catalytic process for the manufacture of hydrogen from water gas first suggested by Mond and Langer has now passed the experimental stage, and is in operation in those cases where hydrogen is required on a large scale, and where the presence of small quantities of inert gases (such as nitrogen) is not objected to. The method consists essentially in the utilization of a catalyst, usually oxide of iron admixed with suitable promoters, such as chromium oxide, to attain equilibrium at relatively high velocities and low temperatures in the water gas reaction $CO + H_2O \rightleftharpoons CO_2 + H_2$. Water gas admixed with steam is passed through the catalytic material at a temperature of 550° to 600° C. The effluent gas is purified by removal of the steam by condensation, carbon dioxide by pressure scrubbing with water, and the 2 p.ct. of carbon monoxide either by pressure scrubbing with cuprous ammonium carbonate solution or by the process of fractional combustion. A catalyst operative with blue water gas at 400° C., instead of 550° C., is urgently needed for this process to attain popularity.

Engineer designers might profitably turn their attention to the water-gas generators. Water gas for hydrogen manufacture must be free from inerts. These, especially nitrogen, are not all derived from the coke, but consist of the residuals from the air-blow. The ideal generator should be capable of easy scavenging, and should possess the smallest possible internal free spaces, which act as reservoirs for the inerts.

The Bergius process of hydrogen manufacture attempts to effect the water-gas production and water-gas reaction in one stage, and at a temperature as low as 300° C. Coke is heated with water to this temperature in autoclaves. The critical pressure of the water at this temperature is 89 atmospheres; and this pressure must naturally be maintained during the reaction. Thallium salts and chlorides are found to exert a markedly catalytic action. The primary reaction expressed by the equation $C + H_2O = CO + H_2$ would probably be very markedly accelerated by fine grading of the coke to ensure a more extended surface. A charge of 12 kgm. of coke and 24 kgm. of water should yield approximately 1600 c.ft. of hydrogen. The autoclave would require a capacity of only 1·5 c.ft. The ultimate solution of the problem of the manufacture of hydrogen from coke will probably be found in some direct process such as this.

The utilization of hydrogen for the manufacture of hexahydrobenzene had already been referred to as a possible development in the gas industry; and the reverse reaction—viz., the dehydrogenation of the saturated ring compounds—is a normal process occurring during the retorting of coal.

The lecturer then went on to deal with the hydrogenation of oils and fats. As catalytic material, he said, nickel is now almost universally employed. Hydrogenation is effected in vessels in which the oil is maintained at suitable temperatures of from 180° to 280° C. The nickel is distributed throughout the body of the oil in a fine state of subdivision, while agitation is ensured by means of paddles, or with the hydrogen itself. The utilization of pressure is becoming more frequent. The crux of the problem of hydrogenation of oils rests with the preparation of the catalyst. The fractional precipitation of the carbonate, followed by reduction at a low temperature in a current of hydrogen, is usually employed. The use of promoter catalysts—nickel and copper or silver—is becoming more frequent. Dr. Lessing achieves atomic distribution by the decomposition of the fat soluble in nickel carbonyl.

The synthesis of ammonia by the process of Le Chatelier and Haber must be considered as a triumph of applied physical chemistry. An experimental and theoretical investigation of the reversible reaction $N_2 + 3H_2 \rightleftharpoons 2NH_3$ indicated that low temperatures and high pressures were essential to the production of ammonia in even reasonable quantities. The Badische Company have developed the process, utilizing a pressure of from 100 to 150 atmospheres, while Claude has increased the pressure to 1000 atmospheres on a small scale and 500 atmospheres on a relatively large scale. As a catalyst, iron is generally employed, admixed frequently with small quantities of promoters. A circulatory process is employed; the ammonia being removed in each cycle by absorption in water, and the necessary amount of hydrogen and nitrogen pumped in to make up for the deficit. The technical problems that had to be solved in the design of machines to deal with gases at such higher pressures and temperatures as 550° C.

were extraordinarily difficult; and in the earlier plants explosions were by no means infrequent.

Catalytic applications to the saponification of fats, the polymerization of isoprene to rubber, and the vulcanization of rubber goods, were the final matters discussed by Dr. Rideal.

At the conclusion of the lecture, Dr. Rideal was accorded a hearty vote of thanks, on the proposition of the Chairman, seconded by Dr. R. Lessing—both of whom paid warm tribute to the valuable national work of Dr. Rideal during the war.

## GRAVIMETRIC ESTIMATION OF CREOSOTE.

A description of the method adopted by Dr. A. Lazar for the gravimetric estimation of creosote (stated to have proved very successful) has been abstracted by the "Chemical Trade Journal" from the "Chemiker Zeitung."

The author explains that several methods have been suggested for the determination of the acid constituents of tar oils, designated under the general term of "creosotes." They all depend upon the behaviour of creosote-containing oil towards caustic alkali solutions. In recent times, where crude tar-oils resulting from low-temperature carbonization, and having a much higher content of creosote, have had to be dealt with, some methods have given very conflicting results.

The method he describes is as follows: The approximate creosote content of the oil under investigation is first determined by means of the "difference method." A quantity of 25 grammes of the oil, weighed out exact to 0·1 gramme, is extracted three times in a separating-funnel with the calculated amount of 5 p.ct. of $N_aOH$ solution. The alkaline washings are then united, and extracted twice with a little ether. The oil-free sodium cresylate solution is decomposed with dilute sulphuric acid; and the pure creosote thus liberated is extracted by two or three shakings-out with ether. The combined ether extracts are dried by means of powdered anhydrous sodium sulphate. Meanwhile, a distillation flask of 50 c.c. content, containing a little porous earthenware, is weighed accurately to within 0·1 gramme, and a dropping-funnel passing through a tightly fitting cork is adjusted in the flask. The dried etherial solution is filtered into the dropping-funnel, and allowed to run slowly into the flask, which is heated on the water bath, so as to drive off the ether. The filter and the dropping-funnel are washed-out with ether, and the washings introduced into the flask. When nothing further distils-over, the condenser is removed, and a test tube secured to the outlet tube by means of several turns of wire. The dropping-funnel is replaced by a thermometer, pushed-down far enough to dip into the liquid in the flask. By heating with a small bunsen flame, the temperature of the liquid is raised slowly to 150° C. The thermometer is then raised to its usual position for a distillation, and the heating carefully continued until the creosote vapours arrive at the bulb of the thermometer. At this point, all the solvent will have been driven-off, and none of the creosote will have been lost. The flame is removed, and the flash is allowed to cool, and then weighed. The method gives the true content of creosote with great accuracy, and permits of the recovery of the greater portion of the ether used.

## NATIONAL ASSOCIATION OF TECHNICAL GAS OFFICIALS.

### Executive Committee Meeting.

[COMMUNICATED.]

AN Executive Committee meeting was held in Birmingham, on Saturday, the 26th ult.

Much time was spent on the consideration of the proposed endeavour to form a Whitley Council, and the determination of the Association's position as to the general trade union movement. As to the latter point, the matter was fully ventilated and discussed. It appeared that any trade union connection was not necessary for the purposes the Association had in view. A resolution was thereupon passed that—"In the opinion of the Executive Committee, it is not desirable that the Association be either certified or registered as a trade union."

In connection with the proposed Whitley Council, it was decided to request the Chairman of the General Council and the Chairman of the Executive Committee to prepare the Association's case for presentation to the Federation of Gas Employers, as soon as the necessary information could be collated.

A report presented by the General Secretary from most of the districts showed satisfactory progress; but difficulty exists in some districts in getting the full organization into working order.

It was felt desirable to have all the rules fully considered, and amendments drawn-up for presentation at the annual general meeting. The Chairman was, therefore, requested to take the work in hand, and bring his recommendations to the next Executive Committee meeting. Certain general principles underlying the rules were discussed. The principal alterations suggested were that Rule IV. Sub-Section 15 (dealing with a levy) should be deleted; that it should be made quite clear in Rule V., Sub-Section 1*a*., that each district should elect its own members to the Council; and that all Council members should retire annually, but be eligible for re-election.

### Midland District.

The Midland District members held a short meeting at Birmingham last Thursday afternoon.

Mr. W. G. S. Cranmer was in the chair; and Mr. F. C. Briggs fully described the policy of the Executive Committee, and gave particulars regarding the formation of a Whitley Council. A discussion followed; and a few questions to the Chairman were answered.

It was proposed and agreed to that the present District Committee members for the Midlands should carry on.

## CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

### Steam Plant in Gas-Works.

SIR,—Reading Mr. Frost's interesting notes on "Water Softening for Boilers" in the "JOURNAL" has caused me to wonder why a gas-works wants steam plant at all. The only possible justification for installing steam-power plant to-day is when the waste heat from the engine or turbine exhaust can be utilized in the works. I cannot conceive of a gas-works requiring exhaust steam unless it can be used for steaming retorts; and then surely it could only absorb a very small percentage.

I am almost daily advising people what kind of power plant to instal. There are many sources of power open to them—gas and electricity from the mains, and steam, gas, or oil engine plant. I am not tied-up to any one system; and for powers between 50 B.H.P. and 3000 B.H.P. I almost invariably advise producer gas power, sometimes driving the machinery direct and sometimes by electrical transmission, according to the conditions. There is no need to take up space in going into reasons for such advice; but they are quite sound from the clients' point of view, which is the only interest I have to consider.

I assume from this—and I cannot believe that the assumption is wrong—that it would pay a gas-works equally well to instal producer gas power for their own works purposes. It is true that the sales department of a gas company is out to sell gas-engines run from the town mains. But evidently gas-works instal steam plant for their own use; and though it would please the sales department to be able to tell its customers that "we use our own products in our works"—viz., gas-engines—it would surely be almost next door to that product to use producer gas power—anyway preferable to steam power from the publicity point of view.

Most of the failures, and I admit there have been many, of producer gas in industrial power plants, have been caused by the "lowest tender" disease. While almost any old steam plant, second-hand or new, will generally work "at a price," "any old gas plant" will by no means invariably work, and requires to be carefully selected and laid down. This, however, should prove no difficulty to a gas-works staff. One assumes they know all about a gas-engine; and to a gas man there is no mystery about a producer.

A Royal Engineer friend of mine, stationed in Palestine during the war, was astonished at what he saw in the plantations power plants. Coal is almost prohibitive in cost; but they get fuel for nothing by gasifying olive refuse and other vegetable matter in producers that drive gas-engines. He said most of the engines he inspected were "barreled," but they "ran;" and as to the producers, in some cases they could not afford to buy them so used home-made ones, constructed of steel oil-drums erected over a clay furnace! Most of the plants were "Deutsch," and all were operated by natives—Turks and Arabs. I have heard of the same thing being done in even some remote countries where rice husks, oil-nut shells, and such refuse, is gasified in a similar way, but I have never before had a description from a man who had actually operated such plants. I would not dare to advise any client in this country to instal such a ramshackle plant. For one thing the average power-plant mechanic here would disdain to be associated with such installations, and nothing but a brand new outfit would do for him, where the minimum intelligence is required and most of the work is "put out." My R.E friend's soldier-mechanics were helpless when any of the plantation home-made plants went wrong. They had to call in the assistance of the natives, who generally got them to go again with the aid of some pieces of wire.

It may be argued that in a gas-works it is necessary to operate various pumps by steam. If that is so, steam can be raised from the gas-engine exhaust heat to the extent of about 2 lbs. of steam per B.H.P. in engines of 100 H.P. and upwards, and more if the heat from the engine cylinders is used as well. Then it may be said that the machinery is too scattered to drive from one or two engines. In that case the best arrangement would be to instal a gas-electric plant driving isolated electric motors. If it were desired to economize capital expenditure, it would surely be no worse to use small local gas-engines than local steam-engines. Anyway the losses in long gas-mains are less than in long steam-mains.

I am aware that in well managed gas-works only waste fuel such as coke and coal refuse is used on the boilers; but this could be used in producers with very much lower consumption of fuel per B.H.P.-hour and a great deal less labour. I have seen it done in one large gas-works—and combined with ammonia recovery, which is obviously much more difficult than with non-recovery. Where gas companies also supply electricity to the public, a gas producer plant seems to me unrivalled for generating electricity.

As a person almost wholly engaged in advising on power plants, I should be most interested to know why gas engineers prefer steam to gas.

11, *Queen Victoria Street, E.C.*, *Feb.* 26, 1921

A. HUGH SEABROOK.

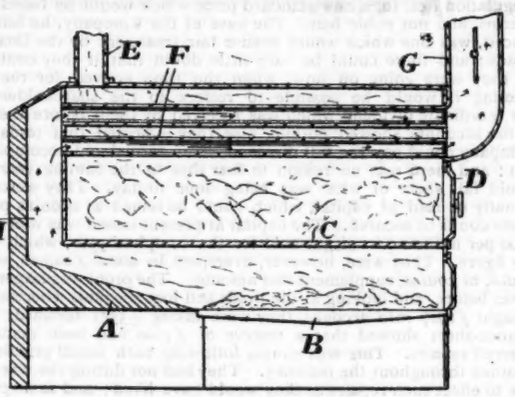
# REGISTER OF PATENTS.

## Retort-Furnace.—No. 156,029.

PFEIFER, B. R., of Jessie, North Dakota, U.S.A.

No. 8327; March 20, 1920.

The object of this invention is the production of gas, creosote, tar, and other products from straw and other vegetation.




Pfeifer's Retort-Furnace.

The furnace used is shown with an upwardly and backwardly slanting wall A. Placed above the grate B is a retort C, the front of which is provided with a door D, closing an entrance through which the material to be treated can be passed. The top of the retort chamber has a gas-duct E for the egress of the gas generated. The retort chamber is provided with a plurality of flues F, the front ends of which are connected with a smoke chimney G. The back ends of the flues connect with the fire-chamber below the retort; a passage H being provided between the wall of the retort and the back of the structure.

In operation the material to be treated is packed around the flues, and the door D sealed shut. Heat from the fire on the grate passing through, and radiating from, the flues serves to carbonize and reduce the material in the retort into its constituent parts—gas, creosote, tar, and other products—the gas passing upwardly and out through the duct E. The creosote, tar, and remaining products can from time to time be removed through the retort doorway.

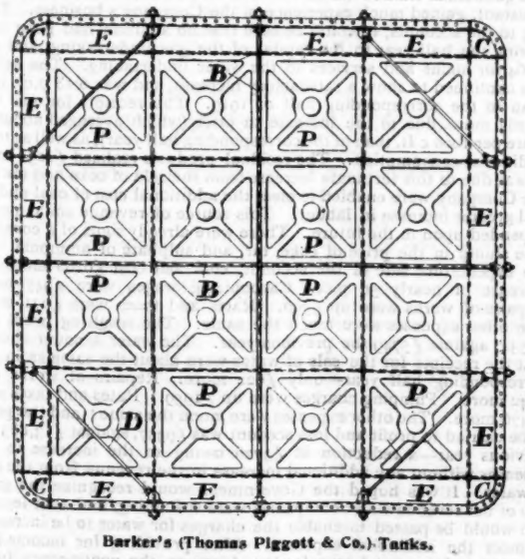
By the use of the invention it is claimed that the straw and other products placed in the retort "can be efficiently and quickly reduced to gas, creosote, and other constituents by inexperienced operators, and the gas and residue collected."

## Tanks.—No. 158,024.

BARKER, T. P., and THOMAS PIGGOTT & Co., LTD., of Birmingham.

No. 24,369; Oct. 6, 1919.

This invention relates to tanks and like structures, which are built-up mainly from flanged plates or similar stamped or pressed units—viz., plate units, edge units, and corner units, each flanged uninterruptedly at the periphery; the flanges at the corners of the various units being so shaped that definite gaps are presented at all places where four corners of adjacent units meet—fluid-tight plugs being used for stopping the gaps, as shown in the plan.




Barker's (Thomas Piggott & Co.) Tanks.

The flanged plate units P are all identical, likewise all the flanged edge units E, and all the corner units C. The corners of all the units are slightly rounded or bevelled at the places where two flanges of the same unit meet. This, besides facilitating their accurate shaping, is utilized for securing the ends of stay bolts. At all flange corners four units meet; and when the four units are assembled, a definite gap is presented owing to the rounding or bevelling on the corner of each unit; and some of the gaps are utilized for securing the ends of horizontal stay bolts B extending between opposite faces of the tank. Other gaps are utilized for securing the ends of diagonal stay bolts D, which gives angular or torsional rigidity to the tank. For this purpose, short Clevis lug bolts, adapted to make fluid-tight joints, are inserted in some of the gaps; the heads being inside the tank and the nuts being screwed-up on the ends of the Clevis bolts outside the tank. Gaps not utilized for securing stay-bolts are made fluid-tight by short bolts or wooden plugs (chemically treated) inserted from the inside of the tank.

## Burner or Nozzle for Gas Heating.—No. 158,331.

MILLER, A. J., of Edinburgh.

No. 26,687; Oct. 30, 1919.

In carrying out this invention, the base of the burner consists of a shallow receptacle, in the bottom of which ports are formed for the introduction of the gaseous mixture, and the top is bevelled, so that the inner edge is at a lower level than the top edge. Superimposed on the base are a number of rings bevelled and separated from the base, and from each other, by narrow bearing strips, whereby a series of inclined and elongated openings is formed. The top of the burner consists of an inverted shallow receptacle, the underside of which is bevelled to correspond with the inclined surface of the adjoining ring. The top of the burner may, if desired, consist of a number of rings constructed, as described, so as to form a series of inclined elongated openings.

The top member of the burner is provided with an outwardly extending flange; and where rings are arranged in the top member, each ring is also provided with a flange, to obviate the risk of foreign matter entering and choking the elongated openings. The parts forming the burner or nozzle are bolted or otherwise fixed in their respective positions.

By constructing a heating burner as described, the gaseous mixture is uniformly heated in the interior of the burner (and more particularly when passing through the narrow elongated openings, which also serve correctly to proportion the flame), so that it is spread-out and diffused, and a very much higher temperature is obtained—thus substantially increasing the efficiency of the burner.

## Distilling Carbonaceous Material.—No. 158,394.

PERRY, W. P., of Leytonstone, E.

No. 27,770; Nov. 10, 1919.

This invention has reference to a continuous process for the "evolution and separation of volatile products from solid carbonaceous material, such as coal, shale, peat, wood, or the like," in which distillation is effected by actual contact of hot gas from any source with the material to be distilled. The gas enters the distilling chamber from a distributing chamber through inlet ports at various heights, and leaves through outlet ports at various heights on another side of the distilling chamber.

It has, the inventor points out, previously been proposed (as in patents No. 15,728 of 1886 and No. 17,613 of 1888) to construct apparatus for manufacturing gas for illuminating and other purposes of three chambers, the centre one connecting the other two by openings in the walls. Then coke is burnt in one outside chamber; and the generated gaseous products of combustion are forced by a blast of air, steam, or gas through the holes into the centre chamber which contains the coal, in order to distil same. The gases pass through the other holes into the third or collecting chamber from which they are taken by a superheating pipe through the coke chamber, when they are ready for use.

The invention has particular reference to the collection of the distilled vapours after passing through the outlets; and it consists essentially of a chamber as distinct from a conduit, called the "collecting chamber," into which the vapour outlets of the distilling chamber open, and having an outlet or outlets for gases, vapours, and liquid distillates. Thus the apparatus is continuous in operation.

## Centenary at Ipswich.

It was pointed out by Sir Daniel F. Goddard, when presiding at the annual meeting, that the Ipswich Gas Light Company this year reach their centenary, having been incorporated on May 28, 1821. That day they were meeting within a stone's throw of the old works in Foundry Lane, which were started by two Mr. Ransomes. The first Manager was Mr. William Cubitt, afterwards Sir William Cubitt. The next Manager, in 1826, he thought was his grandfather, Mr. Daniel Poole Goddard; so that from 1826 to the present day there had been a member of his family in charge of the works, or at the head of the concern. The report stated that, after providing for standing charges, there remained a profit balance of £5678, which, added to the amount brought forward, made a total sum of £16,488. The interim dividend, amounting to £3192, left an available balance of £13,296, out of which the Directors recommended the payment of a further dividend at the statutory rate. This would absorb £2360, and leave a balance of £10,936 to be carried forward. In June last, notices for a general strike were received from the gas-workers, which, after negotiation, were withdrawn, and an agreement made for a considerable increase in wages. The miners' strike in October also seriously threatened to interfere with the gas supply; but as the Company had taken the precaution to accumulate good stocks of coal, they were able to maintain a full supply of gas to consumers. In consequence of the advance in wages and the cost of coal, the Directors were obliged to increase the price of gas to 4s. 6d. per 1000 c.ft. There had been an increase of 6·19 p.ct. in the sale of gas.

# MISCELLANEOUS NEWS.

## BRIGHTON AND HOVE GENERAL GAS COMPANY.

### A Satisfactory Increase in Business.

The Annual General Meeting of the Company was held on Friday last, at the Offices, No. 5, Great Winchester Street, E.C.—Mr. A. M. Paddon (the Chairman) presiding.

The Secretary (Mr. E. L. Burton, F.S.A.A.) read the notice convening the meeting; and the report and statement of accounts were taken as read.

The Chairman, in moving the adoption of the report and accounts, pointed out that this was the first occasion on which they had been submitted in their annual form. The substantial increase of just over 7 p.ct. in the sale of gas was eminently satisfactory, and came at a time when it was especially to be welcomed by the administration, for they were committed to a very extensive programme in regard to the reconstruction of the works. The receipts from the sale of residual products had been very considerably enhanced, though they were not among the fortunate undertakings who had facilities granted them to export coke, in spite of the fact that they had more coke than was required for the needs of the locality, which left them with a margin they could easily have spared. When they could have obtained £6 a ton for it, they were refused the opportunity of exporting it; and within a very few weeks of the embargo being removed, they were offered 30s. per ton for it. During the year, £78,045 of 7 p.ct. redeemable debenture stock was issued at par. The Company's Act, which received the Royal Assent in August, had given them some sadly-needed powers in regard to the issue of capital. The Board had done what they could to promote the interests of the Company by applying for an Order under the Gas Regulation Act, in the hope of restoring the position of the shareholder to that which he occupied before the war; but in this they were being met by very strenuous opposition by the local authorities. Turning to the accounts, he said the capital receipts represented only £452 per million c.ft. of gas sold, which was most gratifying. There were not many companies with a lower figure than this. There had been spent during the period under review practically £95,000 on new works. Delay in granting an application made by them to the Board for permission to raise the price of gas had affected them to the extent of £10,000. From July 1, they were able to rehabilitate their finances; but for half the year they had laboured under grave disabilities from no fault of their own. Quoting some comparisons, he pointed out that, while the price of gas had gone up only about 100 p.ct. upon pre-war prices, coal had risen from 17s. to 51s. 4d. per ton, oil from 2½d. to a maximum price of 1s. 4d. a gallon, and retorts from 4s. per foot run to 18s. 6d. In addition, there were the heavy increases in the cost of labour. In the matter of freight, they were saddled with a freight of 16s. 9d. for every ton of coal brought down from Newcastle; and this compared with somewhere about 3s. 6d. per ton pre-war. The figures would give the proprietors some idea of the difficulties the Directors had had to face. They must, however, look forward to better times in the future.

The Deputy-Chairman (Mr. G. W. Carey) seconded the motion, which was at once carried unanimously.

On the proposition of the Chairman, dividends were declared—subject to the approval of the Board of Trade—for the half year, at the rates per annum (less income-tax) of 6 p.ct. on the "B" preference stock, 4 p.ct. on the "C" preference stock, 6 p.ct. on the "D" redeemable preference stock, 7½ p.ct. on the original ordinary stock, and 5½ p.ct. on the "A" ordinary stock—these being the maximum rates payable.

The retiring Directors (Mr. P. W. Colley and Mr. A. F. Phillips) were re-elected, on the motion of the Chairman, seconded by Mr. H. E. Jones. The Auditors (Mr. W. Cash and Mr. Lewis Hardy) were also re-appointed.

The proceedings closed with the passing of hearty votes of thanks to Mr. C. H. Rutter (the Engineer and General Manager), the Secretary, and other officers and workmen, and to the Chairman and Directors, for the good services rendered to the Company.

## NORTH MIDDLESEX GAS COMPANY.

### Beneficial Effects of Co-Partnership.

The Half-Yearly Meeting of the Company was held on Monday of last week, at the offices, No. 5, Great Winchester Street, E.C.—Mr. A. M. Paddon (the Chairman) presiding.

The Secretary (Mr. E. L. Burton, F.S.A.A.) read the notice convening the meeting; and the Directors' report and the statement of accounts were taken as read.

The Chairman, in moving the adoption of the report and accounts, said there were in them matters of quite exceptional interest. He hoped this would be the last occasion upon which he, as Chairman, would have to associate such an inadequate recommendation in regard to dividends with what was otherwise an almost entirely satisfactory statement of accounts. Another point of interest was that the figures related to the first complete period of the Company's operations since the reconstruction of their business in a practical sense on new lines. A year ago that day, the Company were engaged in a vital struggle—more vital than they cared at the time to recognize, but which, upon looking back, they could now clearly understand to have embodied everything essential in principle and practice in their business. He referred to the great strike. To-day, for the first time, the Board could show the proprietors what the working results were for a period of six months passed under these changed conditions. They would, he thought, agree with him that the statement from this point of view alone was eminently gratifying. There had been an important increase in business of over 11 p.ct., which was a large figure, coming, as it did, upon a whole series of similar developments in the last few years. As stated in the report, the revenue from residual products showed a large increase. They were also told that further advances in the cost of manufacture and distribution had necessitated an increase in the price of gas to its present figure of 5s. 1d. per 1000 c.ft. It was, however, unnecessary to apologize for such a selling price, having in view the charges made by other undertakings. The work of extending and altering the manufacturing and distributing plant had made satisfactory progress. This work it had been absolutely necessary to undertake, in order to meet the growing demands for gas. Application had been made by the Company to the Board of Trade, under the Gas Regulation Act, for a new standard price which would be based upon therms, and not cubic feet. The case of the Company, he felt convinced, was one which would ensure fair treatment by the Board of Trade; and there could be very little doubt that, if they continued as they were going on now, when the time arrived for the next meeting it would be possible to restore to the shareholders the not inordinate dividend which was received by them before the war. If the accounts showed nothing else, they indicated that to-day the Company could pay the full dividend, as an earned and accomplished fact; and there was no reason to fear that in the coming year they would fall short of what was being done to-day. They were now actually in need of capital, which would be issued as soon as proper terms could be secured. The capital at present issued was well under £500 per million c.ft. of gas sold for the complete year, which was a low figure. They were, however, overspent by about £20,000, which would, of course, supplement this amount. The profit was larger than it was before, and looking at the profit and loss account, whereas they brought £1907 into account, they were taking £3551 forward. The balance-sheet showed that a reserve of £4000 had been made for deferred repairs. This was simply following such sound practice as obtained throughout the industry. They had not during the war been able to effect such repairs as they would have liked; and some provision must be made for this. The Directors were pleased to report that the scheme of co-partnership which was sanctioned by the proprietors and inaugurated in the early part of 1920 had received the hearty co-operation of the men, and was working with gratifying results.

The motion was unanimously passed after a short discussion, and the dividends declared.

Extra remuneration to the extent of 300 guineas (free of income-tax) was granted to the Directors, in consideration of their past and present heavy work.

Replying to a vote of thanks, proposed by Mr. C. H. Rutter, Mr. Lawrie Trewby (the Engineer and Manager) said the co-partners had themselves invested some £700 of their own money in the last three months.

## BARNET DISTRICT GAS AND WATER COMPANY.

### Temporary Increase in Secondary Products Values Enables Additional Coal and Labour Costs to be Met.

The Half-Yearly Meeting of the Company was held on Monday last week, at the London Offices, No. 139, Cannon Street, E.C.—Mr. Arthur F. Phillips in the Chair.

The Secretary (Mr. E. D. Davy, A.C.A.) read the notice convening the meeting; and the Directors' report and accounts were taken as read.

The Chairman, in moving the adoption of the report and accounts, said his first duty was to report, with the deepest regret of all the Directors, the great loss the Company had sustained in the death of their late highly esteemed Secretary, who had so ably occupied the position for 22 years. He was a most able Accountant, whose advice the Board accepted with confidence. He was courteous to all, and had a just consideration for everyone. To the vacant position the Directors, after much consideration, had appointed Mr. E. D. Davey—a gentleman trained under the late Mr. Drew, and who had, as his assistant, gained much experience in the Company's business. Turning to the accounts, it would be seen that no addition had been made during the half year to the capital of the gas undertaking, and only £464 for mains and services to the water undertaking. The sale of gas continued to show a satisfactory increase, and was 6·18 p.ct. more than in the corresponding half of 1919. The receipts for gas were £4283 more, due to the increase in price (which averaged about 6d. more per 1000 c.ft. than in the corresponding half year), as well as to the additional consumption. The residual products realized £4031 more. It was due to this fortunate increase from the sale of coke and tar that the Company were enabled to meet the additional cost of coal and the still greater increase in labour. This source of revenue could not be depended upon in the future. There were already signs of a considerable slump in the price of coke, tar, and sulphate of ammonia. On the expenditure side of the account, coal had cost £6208 more—an increase of nearly 50 p.ct. Carbonizing wages were £347 more. Repairs of works were up £390. Rates and taxes were £671 more. The other expenses were much the same. The resulting profit was £8534, against £5749 the previous year. The water account showed that the receipts for the sale of water were about the same as in the corresponding half year—only £622 more. Repairs of works cost £542 more. Pumping charges were up £1959. Rates and taxes were £1476 more. The other expenses were much the same; and the profit to be carried to profit and loss account was £9357, against £13,083 the previous year—a reduction of £3726 owing to the increase in the expenses without any additional increase in the revenue from the sale of water. It was hoped the Government would recognize the great loss of net revenue water companies were sustaining, and that legislation would be passed to enable the charges for water to be increased to meet the additional expenses. After providing for income-tax, interest on loans, and transferring £1000 to the contingency fund, there remained a balance at profit and loss account of £38,514, from which the Directors recommended dividends of 9 p.ct. per annum on the "A" and "C" stocks, 8 p.ct. on the "B" stock, and £6 6s.

p.ct. on the "D" water and gas stocks, less income-tax, which would absorb £10,383, and leave £28,130 to be carried forward. The proprietors might congratulate themselves that the Company had so far been able to maintain the pre-war dividends, without seeking any additional powers. When it might be advisable for the Company to make an application under the Gas Regulation Act would have the consideration of the Directors. It was only right to assume had there not been a war, with the consequent great increase in the cost of all material and labour, the Company would now have been selling gas at a lower price, and the proprietors would have been receiving a higher dividend. In accordance with the provisions of the Gas Regulation Act, the Company must within two years take powers to sell gas by heat units, instead of cubic feet. The works and plant in both the gas and water undertakings had been maintained in an efficient state. To meet the increasing demands for water, the development of the pumping station at North Mimms (commenced before the war) was being carried out, and it was expected that before the summer was over they would be supplying water from that pumping-station. The working results of the half year, both at the gas and water works, had been highly satisfactory. The carbonizing at the gas-works had been efficient both as regards production of gas and economy of fuel; and the results at the pumping-stations were equally satisfactory and creditable to all concerned in the work. The Directors had still with them the many difficulties connected with the supply of coal and what its future would be, as well as the ever-increasing demands of labour. While he was pleased to say all those in the Company's employ had worked well and given no cause of anxiety during the past half year, he might remind the proprietors that the wages paid amounted to £16,873, against £7321 in the last pre-war half year.

The DEPUTY-CHAIRMAN (Dr. J. W. L. Glaisher, F.R.S.) seconded the motion, which was unanimously carried.

Proposed by the CHAIRMAN, and seconded by Mr. COLIN DOCWRA, dividends were declared (less income-tax) for the half year at the rates per annum of 9 p.ct. on the "A" and "C" stock, 8 p.ct. on the "B" stock, and £6 6s. p.ct. on the "D" capital gas and water stocks.

The DEPUTY-CHAIRMAN, in moving the re-election as Directors of Mr. A. F. Phillips and Mr. Alfred Wood, spoke of the great services the Chairman rendered to the Company, and of his admirable qualities as a leader of the Board. Mr. Wood was also a most valuable Director.

Mr. A. W. OKE seconded the motion, which was cordially passed.

Mr. TIBBS proposed, and Mr. J. M. WOOD seconded, the reappointment of the retiring Auditor (Mr. C. P. Crookenden), and this was agreed to.

The CHAIRMAN said the question of the remuneration of the Secretary was a matter for the proprietors. The Board recommended that he be paid a salary of £700 per annum—he paying income-tax and all assistance and allowance for the use of the office.

Mr. DOCWRA seconded the motion, which was adopted.

Mr. OKE, in proposing a vote of thanks to the Chairman and Directors, the Engineer and Manager (Mr. F. J. Bancroft), the Secretary, staffs, and employees generally, said with what great regret it was the proprietors learned of the death of Mr. Drew, whose services they all so much appreciated. The times had been very anxious for the Directors; but, with the assistance of their able officers, they had been able to place before the proprietors a very satisfactory report.

Mr. F. G. PILLEY seconded the motion. He remarked that the proprietors always received the greatest consideration and courtesy from Mr. Drew; and he suggested that the Secretary should be requested to communicate to Mrs. Drew and the family how much they all deplored his loss.

The motion having been passed,

The CHAIRMAN acknowledged the vote on behalf of his colleagues and himself. At the same time, he said he should like to express, on behalf of the Board, their thanks to the officers and the employees generally for their services. Mr. Bancroft was an excellent officer; and he looked after the interests of the Company most keenly. If he (the Chairman) had not him to work with, he was afraid the position of the proprietors would be very different. Mr. Davey had not been officially with them long; but they had known him as assistant to Mr. Drew, and were assured the Company would be well served.

Mr. BANCROFT, on behalf of the officers and workmen, also thanked the proprietors.

## SUTTON GAS COMPANY'S MEETING.

Though the half-yearly meeting of the stockholders of the Sutton Gas Company, held at the offices, on Monday of last week, lasted nearly three hours, the proceedings were not quite so lively as had been anticipated—more than half the time being taken up counting proxies in connection with the votes for the election of Directors.

The section of stockholders, headed by Sir Louis S. Johnson, M.P. for Walthamstow, who, at the recent special meetings, brought about the defeat of the proposal put forward by the Directors for amalgamation with the Wandsworth Company, was present in force, with the avowed object of turning out the retiring Directors and substituting new ones. The retiring Directors were Mr. John Jones and Mr. Arthur Stevens. The nominees of the "independents," as Sir Stanley Johnson termed them, were Brigadier-General Sir Henry P. Maybury, K.C.M.G., C.B., M.Inst.C.E., and Mr. W. Chaffer, described as the London manager, since 1892, of an old-established and successful engineering business with a world-wide reputation in the designing and manufacture of plant for the production, purification, and storage of gas, and the treatment of residuals, who has lived in Sutton for more than thirty years. In proposing the last-named, Sir Stanley Johnson said he was doing it on behalf of the "independent" stockholders, in order to take the first opportunity they had of expressing by the votes of the shareholders their profound dissatisfaction with the manner in which the proposals for their amalgamation with Wandsworth were dealt with, handled, and put forward by the present Board of Directors. What the Board did was deserving of censure and reprobation. The Chairman of the Directors (Mr. Thomas Charles) replied at length; and Mr. D. T. Powell urged the shareholders to leave that "acrimonious discussion where it ought to remain, buried in the vasty deep."

After the count, the figures were found to be as follows: Mr. Arthur Stevens, 6561; Mr. John Jones, 6411; Mr. W. Chaffer, 4475; Brigadier-General Maybury, 4325. Mr. Harry J. Barclay was elected an Auditor, in the place of the late Mr. Ernest W. Drew.

The Directors' report stated that the profit and loss account showed a balance available of £7888, from which the Directors recommended the payment of a dividend, under the sliding-scale, at the rate of 3 p.ct. per annum (less income-tax) for the six months ended Dec. 31, 1920. The revenue account showed that £44,857 was spent in the manufacture of gas; £4109 in distribution, and £1419 in management; other amounts bringing the total expenditure up to £53,400. The sale of gas brought in £37,715, and residual products £15,430. The gas made was 179,613,000 c.ft., and sold 163,818,800 c.ft.

In proposing the adoption of the report and accounts, the Chairman pointed out that consumers had for a very long time past been, to some extent, living upon the income and capital of gas shareholders; but everything possible was being done to take advantage of the recent Acts of Parliament. With regard to the accounts, the cost of coal had greatly increased; and wages had gone up, in the case of carbonizing, from £1700 to £2237. This was all due to awards which were made in respect of labour.

Mr. Ferguson Bell said he was disappointed at the return they received from residual products. The total for the six months on the cost of coal was 47½ p.ct. During the last half year residual products had generally commanded exceptionally high prices. At Derby they obtained 91 p.ct., at Horsham 63 p.ct., and at Richmond 60 p.ct.; and Sutton ought to have secured about 60 p.ct. He was also disappointed that the dividend was reduced from the meagre 3¾ p.ct. to 3 p.ct.

In reply, the Chairman said that 47½ p.ct. was the return which ordinary companies generally received.

The report and accounts were adopted.

## REPORT OF RADIATION, LTD.

The accounts for 1920 to be presented by the Directors at the meeting next Friday, state that after bringing in £23,741 from 1919, the balance of the revenue account is £178,293. Deducting the interim dividends paid in August last, there remains at disposal the sum of £121,794, which it is recommended be appropriated to the payment of final dividends to Dec. 31 of 3 p.ct. (less income-tax) on the preference shares, 3½ p.ct. (free of income-tax) on the fully-paid ordinary shares, and 3½ p.ct. (free of income-tax) on the partly-paid ordinary shares—leaving to be carried forward £40,753.

The Directors report that during the year the whole of the preference shareholders of the Wright, Richmond, and Davis Companies, and the whole of the preference and ordinary shareholders of Fletcher, Russell, & Co., Ltd., have exchanged their shares for shares of the Company in accordance with the respective schemes of exchange.

In December last an offer was made by arrangement with the Directors of Wilsons and Mathiesons, Ltd., of Leeds, and those of its associated Company, the London Scottish Foundry, Ltd., to the ordinary and preference shareholders of the former Company and the preference shareholders of the latter, to exchange their shares for shares of this Company; and the whole of these three bodies of shareholders have accepted and carried through the exchange. Under the terms of offer, this Company have to pay dividend, or its equivalent, on the shares allotted in exchange for the shares of the Wilsons and Mathiesons and London Scottish Companies from the dates to which dividends have been paid by these Companies on such transferred shares; and this Company will be receiving the dividends upon the shares acquired in these Companies as from the same dates.

The issued capital of the Company is increased by the shares allotted in consequence of all these exchanges of shares. The income of the Company also is increased proportionately by the further dividends received on the shares thus acquired, while conversely there is a corresponding increase in the dividends to be paid by this Company.

It was a condition of the agreements entered into for the exchange of the shares in Wilsons and Mathiesons, Ltd., that Mr. William Mathieson and Mr. James William Wilson become Directors and Managing-Directors of this Company; and a resolution will be submitted in regard to these appointments. In order to provide for this and any possible future case of the kind, it is proposed to make an amendment to the Articles of Association, for which purpose the necessary extraordinary meetings are being called.

**Street Lighting at Burnley.**—Mr. J. P. Leather, Gas Engineer of Burnley, in a report on the cost of street lighting, points out that for 32 years prior to 1919 the charge remained at £2 10s. per lamp. His Committee have now decided that the charge for lamps lighted the full period be fixed at £6 1s. 6d. per lamp per annum. For restricted lighting, there is to be a fixed charge of 7s. 6d. per annum for all lamps, whether lighted or not, and a charge of £5 14s. for every 3900 hours each lamp is lighted.

**Watford Gas and Coke Company.**—Dividends were declared (subject to the approval of the Board of Trade), at the half-yearly meeting of the Company, at the rates per annum, less income-tax, of 3¾ p.ct. on the "A" capital stock and of 2⅝ p.ct. on the "B" capital stock. The Chairman (Mr. E. J. Slinn) said they were very proud of their co-partnership scheme, which had been working for over eleven years. The co-partners held among them over £7000 of the Company's stock. This was all for the good of the undertaking, and in uniting employees and employers in one common bond made for mutual understanding and mutual respect. The demand for gas was greater than ever; and during the past half year the sales showed an increase of over 2 p.ct. compared with the corresponding six months of 1919.

## GAS REGULATION ACT APPLICATIONS.

The following further notices have appeared in the "London Gazette" of applications by gas undertakings to the Board of Trade for Orders under the Gas Regulation Act.

### Isle of Thanet Gas Light and Coke Company.

The standard price now authorized in respect of the supply of gas by the undertakers is 4s. 2d. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 1s. 8d. per therm.

### Walker and Wallsend Union Gas Company.

The standard price now authorized in respect of the supply of gas by the undertakers is 3s. 2d. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 1s. 4·6d. per therm.

## SPECIAL ORDERS UNDER SECTION 10.

### Harwich Gas and Coke Company.

The Company are applying to the Board of Trade for a Special Order to give them power to utilize additional lands for gas-works purposes, to raise further capital, to regulate the supply of gas, to increase dividends on existing capital, to buy and sell gas in bulk, and for other purposes.

### Salisbury Gas Light and Coke Company.

Application is to be made by the Company for a Special Order to authorize them to extend their limits of supply; to prescribe the price for gas supplied within the extended limits, and vary prices within the existing limits; to empower the Company to acquire additional lands and to raise further capital; to change the name of the Company; and for other purposes.

### Stoke-on-Trent Corporation.

The Corporation are applying for a Special Order to authorize them to raise further money, to repeal powers of the Newcastle-under-Lyme Corporation and Stone Gas Light and Coke Company, Ltd., and to enable them to supply gas in the parishes of Stoke-upon-Trent and Trentham and in part of the parish of Stone Rural.

### Walker and Wallsend Union Gas Company.

Application is being made by the Company for a Special Order empowering them to raise additional capital, to pay dividends varying with half-yearly charges for gas, to buy and sell gas in bulk, and for other purposes.

## GAS AFFAIRS AT NEWCASTLE-ON-TYNE.

### Applications under the Gas Regulation Act.

At a Meeting of the Newcastle City Council on Wednesday last, a report of the Parliamentary Committee was presented relative to an application to the Board of Trade by the Newcastle-upon-Tyne and Gateshead Gas Company, under section 1 of the Gas Regulation Act.

Alderman Sir George Lunn (the Chairman of the Parliamentary Committee) said the situation which had arisen since the last meeting of the Council had become somewhat acute in importance. The report of the Parliamentary Committee set out the main features of the situation which had now arisen with regard to the application of the Gas Regulation Act, 1920, to the City of Newcastle-upon-Tyne. The Act, passed somewhat hurriedly in the House of Commons, and, as he thought, without due consideration, was a General Act. It introduced, in principle, a fundamental change in the method of charging for gas. The Newcastle and Gateshead Gas Company were applying to the Board of Trade for an Order which, if granted, would mean, first, that it would relieve the Company from the necessity of supplying gas at a minimum calorific value of 500 B.Th.U. If they got the Order, they would certainly seek to get a lower calorific value in substitution, as a commencement. It was always the first step that counted. The Council would make a big mistake if they allowed this to pass without due examination. It would perpetuate itself, and become the initial standard. Afterwards the Company could vary the quality on a calorific basis, either up or down; but the initial standard price per therm would be the base from which any future revision would be calculated. The Committee had been compelled to seek the help of a gas expert—Mr. W. R. Herring, M.Inst.C.E.—and he would read one or two sentences from his report. Mr. Herring said: "The importance of adjusting in the first instance a true and proper price per therm in relation to the present prescribed parliamentary standard of quality is of supreme importance, as the price per therm once established will be the rate at which the gas will be paid for irrespective of the initial quality until the initial price per therm is altered again by Statute." Later in the report, Mr. Herring said: "The Company apparently intend to supply a 489 B.Th.U. gas. They will thus be supplying 4·89 therms per 1000 c.ft., and would receive on their old standard rate the equivalent of 32·274d. per 1000 c.ft. for gas of a lower quality—viz., 489 B.Th.U., instead of the standard of 500 B.Th.U. fixed by the Act of 1916. It is obviously in the interests of the Company to obtain a high initial price per therm." In addition to the question of quality, there was that of the price to be charged; and this was of great importance. In dealing with values and variations in the rates of exchange, he was afraid there might be some leakage against the consumer in the change to the calorific value. The Gas Light and Coke Company had adopted a standard of 1s. 3·2d. per therm; and the Newcastle and Gateshead Gas Company were apparently trying to bring their costs up to this figure, and had to produce figures to show that their cost of production since the war broke out had gone up sufficiently to bring them up to a price of 1s. 3d. Never was there a more inopportune time to make a change of this kind. ["Hear, hear."] If it could be postponed for even twelve months, the figures would be materially different. The costs of production were abnormal and extravagantly high. It would be necessary to examine carefully the figures of the Gas Company, and to challenge them. There were items in the Gas Company's statement of increased costs of production that ought not to be there. Depreciation of plant and buildings was included in increased costs. This should not be dealt with in the trading account, but in the profit and loss account. They should ascertain the profits, and provide for depreciation and dividend; they should not ask the consumer to provide new plant which became the property of the Company. It was sought also to make a charge against the cost superannuation for employees, which was not at present in existence. He was not challenging the desirability of having a superannuation fund for the employees of the Company; but he was not sure that it ought to be added to the cost of making the gas. It should be taken out of the profits of the Company, and paid for before the dividend was paid. What the Committee asked was authority to engage technical experts. They wanted to have a complete inquiry into the quality of the gas the Company supplied. He did not think it was necessary to get financial experts; the City Treasurer had already examined the accounts and would give them all the assistance that was needed financially. They wanted to obtain if possible a public inquiry, and generally to do all they could to protect the interests of the consumer. In pre-war days the maximum price of gas that could be charged was equal to 8d. per therm. The cost of production in the meantime had gone up 8½d. per therm; and they proposed now a maximum per therm of 1s. 4½d. The price of gas at the maximum would be doubled as between the pre-war price and the present price. For every 1d. per 1000 c.ft. put on the price of gas, the gas bill for the general body of consumers was increased by £16,000; so that the Council would see how staggering the figure would be if the price was doubled. The Walker and Wallsend Gas Company were seeking powers similar to those in Newcastle. They were making two applications. They were asking for an Order authorizing them to charge 1s. 4½d. per therm, equal to 6s. 11d. per 1000 c.ft. The Parliamentary Committee asked the Council to deal with the application of the Walker and Wallsend Gas Company in the same way as with the Newcastle application. They had big interests in the Walker and Wallsend Company. If they could not get a public inquiry, they should take every other step possible, both by documents and everything else, to see that the interests of the consumers were safeguarded.

Mr. De Loriol said if the Gas Company got the powers the price would be 6s. 4d. Consumers were now paying 3s. 4d.; whereas they used to pay 2s. before the war.

Sir George Lunn: That is the maximum price, 6s. 4d., which they could charge. They could avail themselves of that.

Mr. De Loriol: Then that is three times as much as we were paying pre-war?

Sir George Lunn: Yes.

The report was adopted.

## TETBURY GAS COMPANY'S CHARGES.

### Complaint to Profiteering Committee.

At a Meeting of the Tetbury Profiteering Committee, on Feb. 26, there was heard a complaint by Mr. Maurice J. Pride, with reference to charges by the Tetbury Gas Company, Ltd., for rent of a lighting meter, the price charged for gas for cooking and non-illuminating purposes, and the charge for the meter for the latter supply.

Mr. Pride stated that the Company had, as an inducement to their customers, advertised that they would supply gas for cooking and non-illuminating purposes at the ordinary price charged for lighting, less a discount of 10 p.ct. to customers who would buy their stoves, &c.; and that for this purpose the Company would supply a meter free. He had spent something like £20 on stoves, &c., in order to qualify for the 10 p.ct. discount and the free meter; but he was now charged a price which represented only about 5½ p.ct. discount. He objected to the charge of 8s. a year rent for his lighting meter, which only cost the Company £1 7s. 4d. fourteen years ago, and considered that the Profiteering Committee had come to a decision at a previous meeting on information with which he could not agree. The Committee had on that occasion relied on an assumption that the life of a meter was only ten years; but he had a letter with him from one of the best makers (the makers of his meters) to say they frequently had meters returned to them for repair which were made by them in the sixties. He spoke with a long experience, when he had stated thirty years to be a fair average life for the meters in Tetbury.

Mr. Fowles (the Chairman) pointed out that the Company had given notice of the change of price.

In reply to this, Mr. Pride contended that, having paid a consideration in order to get the promised privilege of 10 p.ct. discount and the free meter, he and other customers who had also purchased stoves were fully entitled to a continuance of the privilege. The question of the Company's half-yearly balance-sheet did not concern the matter. He believed this showed a very small margin of profit for the last half year. The point was, if he and other customers had not been put to the expense of buying stoves, &c., the Company might be at liberty to make changes.

The Committee refused to alter their previous decision as to the rent of the meter, and stated that they did not consider the amount charged as arrears for meter-rent and discount was a matter they should decide.

[The Committee's previous decision, which was reported in the "Journal" for Nov. 10, p. 341, was that the complaint must be dismissed, on the ground that there was no *prima facie* case.]

W. G. Field & Co., Ltd., has been registered as a private company, with a capital of £10,000 in 8000 preference shares of £1, and 40,000 ordinary shares of 1s. each, to carry on the business of manufacturers of and dealers in gas mantles, &c.

## LONG SERVICE RECOGNIZED AT LEA BRIDGE.

The staff (works and clerical) of the Lea Bridge District Gas Company held a successful inaugural staff dinner at the Abercorn Rooms, Liverpool Street Hotel, on Saturday, Feb. 26, with Mr. F. W. Cross, M.Inst.C.E., the Engineer and General Manager, in the chair. He was to have been supported by Mr. Richard Sandell, the Secretary of the Company; but unfortunately a slight indisposition prevented this gentleman being out at night.

A surprise was sprung upon the Chairman, for the members of the staff had carefully preserved the secret that they intended to use the occasion to present him with a souvenir to commemorate his completion of 25 years' service with the Company, and also at the same time to commemorate the life-long service of 53 years of Mr. Richard Sandell. The souvenirs consisted in each case of a handsome silver fruit dish, and a case of silver spoons for Mrs. Cross and Mrs. Sandell; and they were presented in a few well-chosen words by Mr. H. Hand, the Assistant Secretary (himself an official of 29 years' service), and suitably acknowledged by Mr. F. W. Cross, on behalf of Mr. Sandell and himself.

The dinner was followed by an enjoyable musical programme from the talent among the members of the staff.

From the remarks made during the presentation, it was gathered the Lea Bridge District Gas Company was formed in 1868; that in 1895 the consumers numbered 1350, and the gas sold was 79 million c.ft.; while in 1920 the figures had increased to 8890 ordinary consumers and 17,450 slot-meter consumers, or a total of 26,340, and the sale of gas had increased to 730 million c.ft. The mileage of gas-mains in 1895 was 38; while in 1920 it had risen to 105. The Company are now laying about 3½ miles of 16-in. cast-iron main from the works to Chapel End, to meet the growing demand of the districts bordering on Billet Lane, Wadham Road, and Highams Park.

The local rates and taxes paid by the Company in 1895 were about £730; whereas in 1920 they amounted to the total of over £9000. While the wages to workmen in the district in 1895 amounted to £4750, the total paid in 1920 was £48,500.

## SUGGESTED GAS BOARD FOR SOUTH WALES.

The members of the Town Planning Institute, at a meeting held last Friday in the rooms of the Institution of Municipal and County Engineers, Victoria Street, S.W., listened to an address by Mr. Edgar L. Chappell, on the "South Wales Regional Survey." This was the first public statement on the report of the Committee set up by the Ministry of Health to survey the South Wales area and to make definite recommendations in regard to its housing and town planning problems. The report has been made to the Ministry, but it is not yet published. The Committee survey exhaustively the existing conditions, and make some very strong recommendations regarding the re-adjustment of the local government areas.

Dealing with the lighting services of the district, the Committee say that large-scale production of gas is equally as important as the generation on a big scale of electrical energy. There are at present in the region about fifty gas undertakings, mostly owned by small companies. In several instances there are half-a-dozen or more small and uneconomical installations within a few miles of one another. There are in the region also about 2600 bye-product ovens capable of yielding a large quantity of gas, most of which could be rendered available for public and domestic consumption. The Committee favour the large-scale production of gas at well-equipped works situated at suitable centres, as at the entrance to valleys, and urge the formation of a regional board or boards to control gas production and distribution.

## GAS UNDERTAKINGS AND HOUSING SCHEMES IN SCOTLAND.

### The Outlay on Mains and Service-Pipes.

On Wednesday last, an important meeting took place in Edinburgh between the Scottish Board of Health and representatives of gas undertakings in Scotland, when the matter of the capital outlay for mains and service-pipes was dealt with, and the need for this part of the expenditure being met by the Housing Authority.

The Board of Health was represented by, amongst others, Mr. Macpherson, Legal Adviser (who acted as Chairman), Mr. J. L. Jack, the Director of Housing, and Mr. Ronald, Architect and Engineer. From the gas undertakings were Mr. J. W. M'Lusky, of Glasgow, Mr. Alex. Masterton, of Edinburgh, Mr. Alex. Yuill, of Dundee, Mr. George Keillor, of Greenock, Mr. A. S. Nisbet, of Paisley, Mr. J. Campbell, of Dumfermline, Mr. J. W. Napier, of Alloa, also Mr. W. M. Mason and Mr. Beckett from the British Commercial Gas Association.

A memorandum had already been sent to the Board, in November last, setting forth in considerable detail the unsatisfactory conditions under which gas departments were being called upon to furnish supplies of gas for different housing schemes.

Mr. M'LUSKY stated that the expenditure for new mains was altogether extraordinary, the cost having increased by four times compared with pre-war, that in addition to this the length of mains needed for such schemes, with only ten consumers to the acre, was out of all proportion, and that the proposition was unsound financially. He urged that the mains should be considered as part of the housing scheme as a whole, and that the expense should be borne by the housing authority. He pointed out the very serious waste of public money in laying down a dual system of gas and electricity mains, and that a very considerable saving of outlay would result to the Authority, if gas lighting were resorted to for both the houses and street lighting. This would help to increase the consumption of gas. Mr. M'Lusky finally urged that as the consumption of gas in a house for cooking only did not yield sufficient revenue to prove a reasonable return on capital, gas should be used for heating, lighting, and cooking, and that in addition the authority should contribute to the cost of the mains.

Mr. MASON made reference to the saving in building construction by the compulsory use of gas-fires, and stated that this was equal to £10 per room or £30 per house. He considered this advantage should be recognized, and in some way returned to the supplier of gas. This saving alone would go a long way towards paying for the proportion of outlay per house for mains and services. He enlarged upon the advantages of the use of gas in the national interest and in the saving of a woman's work, and also of smoke abatement. Gas was an essential equipment of households. He instanced the case of the Well Hall Estate, when 1300 houses were erected with gas and electricity mains and services, but only eleven occupiers agreed to use electricity.

Mr. BECKETT detailed the position of gas undertakings in the Metropolitan area, and submitted figures to show that it was quite impossible, with the limited number of consumers to be supplied and on account of the increases in the costs of labour and materials, for the gas industry to attempt to give free services as regards mains, services, and apparatus—as was common practice in pre-war days. In many instances the business was simply not worth carrying on—it was unremunerative, and in many cases would be refused.

Mr. YUILL referred to the case of Dundee, and submitted figures showing that in one scheme a loss amounting to over £3000 per annum would be incurred if the present recommendations were insisted on. He emphatically stated that he would much prefer that the gas department should have nothing whatever to do with the business.

The CHAIRMAN, in the course of his reply, made it clear that the policy in Scotland was decided by the Scottish Board of Health; that they were quite independent of London; and that the practice in England would not necessarily be accepted by them. He stated that his Board had decided to meet the cost of all service-pipes from line of street to meter; that wash-boilers would be provided; and that piping would be fixed for gas-fires. As regards cookers, the cost would also be met by the Board, on the understanding that a register grate, and not a kitchen range, was provided in the living room, and provided that the cost of cookers, grates, and fittings for the provision of hot water, did not exceed the sum allowed by the Board per house. In the important matter of the Board's meeting the cost of mains, he was much impressed with what had been stated by the deputation as regards the avoidance of capital outlay in providing both gas and electricity supplies. This point would have their serious consideration, with a view to putting down gas-mains only, unless in exceptional cases. He could only promise that the evidence laid before them would have the Board's best consideration, and that he quite recognized the financial burden which housing schemes placed upon gas undertakings.

## TRADE NOTES.

### [For "Journal" Advertisers.]

**Keith-Blackman Mixture-Control Outfit.**

The James Keith & Blackman Company, Ltd., supplied some months ago their mixture-control outfit, comprising injectors, governors, and air-fan, to a well-known varnish manufacturer, whose report on the results attained, as compared with coke firing, is as follows: "The figures are taken from Oct. 6 to Dec. 31, 1919 and 1920, respectively; Oct. 6, 1920, being the date when gas was first used. To boil 1 ton of oil, we used in 1919, 5 cwt. 2 qrs. 10 lbs. of coke, at 2s. 6d. per hundredweight, or 13s. 11d. for the fuel used. With the gas, the fuel and electric power and rent of gas and electric meters work out at 7s. 10d. per ton of oil boiled. This is not taking into consideration the extra cost of labour entailed in using coke-fires, and also the overtime we had to pay when we had adverse draughts and the coke would not burn. With the gas we get a uniform heat, and we have no overtime to pay, and no waste of fuel; and we can now do 2 tons of oil with the gas in the time occupied doing the 1 ton of oil with the coke."

## CURRENT SALES OF GAS PRODUCTS.

### The London Market for Tar, Tar Products, and Sulphate.

LONDON, *March 7.*

The market for tar products continues in a stagnant condition. Apart from orders for road tar, very little business is being booked, and prices continue purely nominal.

Sulphate of ammonia is in good demand for the home trade at the schedule price.

### Tar Products in the Provinces.

*March 7.*

There is practically nothing to report as regards the market for tar products. Pitch is still very quiet; and we hear of some very low prices having been accepted for the forward position. In creosote, some sales are reported at low figures. Crude carbolic is still almost an unsaleable article.

The average values for gas-works products during the week were: Benzole 90 p.ct. North, 2s. 10d. to 3s.; crude 65 p.ct. at 120° C., 2s. 3d. to 2s. 5d. naked at makers' works; 50-90 p.ct. naked, North, 2s. 11d. to 3s. 1d. Toluol, naked, North, 3s. to 3s. 1½d. nominal. Coal tar crude naphtha in bulk, North, 1s. 1d. to 1s. 2d. Solvent naphtha, naked, North, 2s. 7d. to 2s. 9d. Heavy naphtha, North, 3s. to 3s. 2d. Creosote, in bulk, North, liquid, 10d. to 10½d.; salty, 9½d. to 10d. Heavy oils, in bulk, North, 1s. to 1s. 1d. Carbolic acid, 60 p.ct., 1s. 10d. to 2s. Naphthalene, £25 to £50; salts, £8 10s. to £10, bags included. Anthracene, "A" quality, 1s. per minimum 40 p.ct.; "B" quality, nominal.

## FROM A MARKET CORRESPONDENT.

### Tar Products.

There is very little alteration in conditions in this market with the exception of pitch, which has developed considerable weakness. In almost every other line buying seems to have practically ceased—there being a general idea that prices must come much lower. The consequence is that buyers are only taking what they need for immediate requirements. Pitch is now down to somewhere in the neighbourhood of £6. A more exact quotation is difficult to give. This is the lowest price that has been heard of for some time; and it is quite possible that sellers would take even less if they could get rid of a good quantity. But there are no large buyers about. Solvent naphtha is dull and easier. There is very little doing in naphthalenes, except that the price of refined is a shade better. Carbolic acid is stagnant, and very little is now being extracted. Crystals are round about 6½d. per lb., at which price there is no demand. Cresylic acid is also entirely neglected. Creosote is quiet, but possibly not quite so bad as other sections of the trade. Curiously enough, the price of creosote is about five times the price of pre-war days, while other bye-products are coming down more to a pre-war basis. The explanation, of course, is that there has been considerable development during the war in the liquid fuel industry. There is no change in intermediate products.

The range of quotations is as follows:

Benzole: 90% London 3s., North 2s. 6d. to 2s. 8d.; crude 60-65%, 1s. 9d. to 2s.; pure, 3s. per gallon naked.

Crude Tar: London, 105s. to 115s.; Midlands, 107s. 6d. to 112s. 6d.; North, 105s. to 107s. 6d. per ton *ex* works. Refined tar, 85s. per barrel (free) on rail.

Pitch: London, 125s. to 130s. per ton f.o.b.; East Coast, 115s. to 130s. per ton f.o.b.; West Coast, 112s. 6d. to 130s. f.a.s., with Manchester 120s. per ton, and Glasgow 125s. per ton; South Wales, 120s. per ton.

Solvent Naphtha: 90-160, 2s. 9d. per gallon.

Crude Naphtha: Naked, 10d. to 11d.; North, 10d. per gallon.

Heavy Naphtha: 2s. 8d. per gallon.

Naphthalene: Refined flake, £28 to £30 per ton nominal; inferior, £18; crude, £7 to £14 per ton, according to quality.

Toluol: Naked, 3s. per gallon nominal; North, 3s.; pure, 3s. 6d.

Creosote: 10d. to 11d. per gallon; heavy oil, 8½d. per gallon in bulk.

Anthracene: 40-45%, 1s. 1d. to 1s. 3d. per unit per cwt.

Grease Oils: 18° Tw. (naked), £6 per ton f.o.r. makers' works.

Pyridine: 15s. per gallon.

Aniline Oil: 1s. 6d. per lb., drums extra.

Aniline Salts: 1s. 8d. per lb.

Cresylic Acid: Crude, 2s. 3d.; dark 95-97%, 2s. 6d. to 3s.; pale 97-99%, 3s. to 3s. 6d., per gallon, drums free.

Carbolic Acid: Crude 60%, 1s. 8d. per gallon; crystals 40%, 6½d. per lb. nominal.

Salicylic Acid: Technical, 1s. 6d.; B.P., 2s. per lb.

Xylol: Pure, 3s. 6d. to 4s.; commercial, 3s. to 3s. 6d. per gallon.

Resorcin: 7s. 6d. to 8s. 6d. per lb.; pure, 10s. per lb.

Alizarine 20%: 2s. per lb.

B. Naphthol: 3s. per lb.

### Sulphate of Ammonia.

There is no change in quotations of sulphate of ammonia; the price for March-May deliveries being £24 11s. per ton. The home demand is improving, and some desire is being shown by farmers for early deliveries. On the other hand, export trade is rather slack.

**Staveley Gas Dispute.**—A dispute has arisen between the Staveley Parish Council and the Gas Company; the Council having unanimously decided not to pay the account of the Company for the supply of gas for public lighting. The trouble is the outcome of complaints made at a Parish Council meeting concerning the alleged unsatisfactory gas being supplied by the Company, and also that the street-lamps were not being lit.

**Results from the Leeds Gas Exhibition.**—The interesting announcement was made last week-end that close upon 20,000 people had paid for admission to the recent gas exhibition; and as a result of the display and demonstrations of apparatus, the Gas Department had already received orders for the installation of 1200 new appliances, including fires, cookers, radiators, and geysers. Up to the time of the exhibition, the numbers of appliances in use in Leeds, apart from lighting, were 24,171 cookers, 4636 fires, and 1927 radiators.

**Working at Lancaster.**—The estimates of the Lancaster Gas Committee, which were submitted to the Town Council on the 4th inst., showed that the income for the year ended March 31 was £77,394, against £58,215 estimated last year. The expenditure was £71,125, leaving a profit of £6269. It was agreed to give £4000 of the surplus £6000 to the borough fund, and to apply £2000 to the working balance, as more capital was found to be necessary in the present state of the markets. Only £2000 was earmarked for the rates next year. Mr. Till (the Chairman of the Gas Committee) paid a high compliment to Mr. G. Dixon (the Engineer) and staff.

**Wakefield Gaslight Company.**—Alderman G. A. Moorhouse, J.P. (the Chairman), presided at the annual meeting held at the offices of the Company on Monday, Feb. 28. In moving the adoption of the report, he referred to the advances in coal and freights during the past year, and the difficulty of obtaining suitable coal. The sale of gas was a record, and showed an increase of 21,163,700 c.ft., or 7·56 p.cent. Final dividends of 1⅞ p.ct. on the ordinary and 2½ p.ct. on the maximum—making 3¾ and 5 p.ct. for the year respectively—were approved. Votes of thanks were accorded the Chairman and Directors and the Managing-Director (Mr. H. Townsend), the Secretary, and their respective staffs.

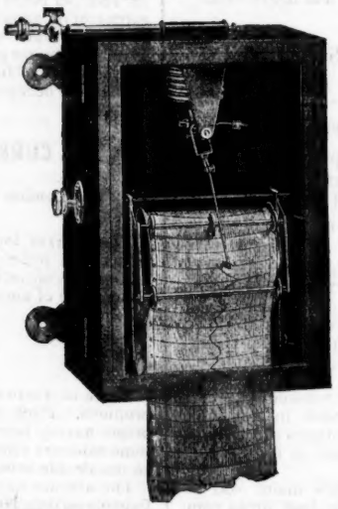

# SIMMANCE'S DEAD BEAT RECORDER

## TAPE CHART PATTERN

**For Pressure or Vacuum.**

**NO LIQUIDS USED.**

The chart roll is renewed 6 times a year.



The record can be torn off at any interval.

Lowest Range: 0-2 inches water.

Highest Range: 0-300 lbs. per sq. inch.

Suitable for Gas, Air, Water, or Steam, and may be used on Crude Gas.

**MAKERS:**

**ALEXANDER WRIGHT & Co., Ltd., WESTMINSTER**

## Further Carbonizing Plant for Reading.

The accounts for the twelve months ended Dec. 31 were presented at the annual meeting of the Reading Gas Company, when it was reported that the sales of gas had been well maintained, and showed an increase of 36,154,400 c.ft There is little doubt the increase would have been much greater had it been possible to accept the numerous orders received for additional apparatus. Unfortunately, there had been great difficulty in obtaining plant; but the Directors have entered into a contract for a new vertical retort installation. They hope this will be brought into use before next winter, and thus enable them to meet all demands for gas. To cover the cost of the new plant, an issue of £40,000 of 7 p.ct. redeemable debenture stock was made in December. The issue was largely over-subscribed; the greater proportion being taken up by existing stockholders and consumers of gas in the district. The Chairman (Mr. G. W. Webb) said a considerable portion of the repairs and renewals to plant had been unavoidably deferred during the war; and a suspense fund had been formed to meet the cost of this work. Owing to the great increase in the demand for gas, and the impossibility of carrying out plant extensions, it had been difficult to maintain a full supply during the winter. At one time during the cold spell before Christmas, it looked as though the supply would have to be curtailed—more than 23½ million c.ft. being sent out during the third week of December. Thanks, however, chiefly to the efforts made by the Engineer (Mr. Douglas D. Helps), they had been able to carry on without restricting the supply. Though the year had been a stormy one, there were several bright rays of sunshine, which promised well for the future. A dividend of 5 p.ct. per annum (less income-tax) was declared; and at a subsequent extraordinary general meeting, the Directors were authorized to raise further capital.

**Stourport Public Lighting.**—The Stourport Urban District Council have accepted the tender of the Gas Company for the street lighting of 94 lamps at a cost of £3 18s. 7d. each, as against £2 19s. in the previous year. Mr. Constantine, replying to criticisms, said the gas in Stourport was cheaper than any other town of its size in Worcestershire, Warwickshire, or Herefordshire. The Stourport Gas Company had made nothing out of the street lighting for years, neither did they get any thanks for it.

**Motor Taxation and Benzole.**—In connection with the Kirkcaldy parliamentary election, the Automobile Association and Motor Union addressed questions to each of the candidates on the subject (among other things) of motor taxation and motor spirit. Both candidates undertook to support legislation for the reinstatement of taxation on motor fuel as an alternative to the present inequitable system; legislation to encourage the carbonization of coal by all large consumers in this country, so that benzole and other bye-products will be available to place the country in some degree independent of imported motor spirit; and all reasonable measures designed to further the production of home and Empire produced motor spirit.

## Wellington (Salop) Gas Company and Amalgamation.

The report adopted at the annual meeting of the Wellington Gas Company stated that for the year ended Dec. 31 the revenue was £22,163, and the expenditure £19,464, leaving a surplus of £2699. A dividend was declared, making 4¾ p.ct. (less tax) for the year—the maximum permissible. The output of gas showed an increase of over 12 p.ct. The Chairman (Mr. C. W. Leake) said the profit on the year's working of £2699 was satisfactory. While skilful management had kept down the increase in gas charges to the extremely moderate figure of 45 p.ct. over the pre-war price, even this had entailed the penalty of a reduction of dividend from 6¼ to 4¾ p.ct. In preference to spending money on repairs and renewals of old plant, the Company decided to try a new type of gas-making apparatus, and had installed a small unit of what was known as a complete gasification plant. A large volume of gas per ton of fuel was obtained; but there were no saleable bye-products. It was likely that along such lines as these great progress would be made towards cheapening gas. The plant they had erected was doing excellent work; and they were satisfied that the money had been well and wisely expended. The Directors had long felt that an amalgamation with smaller concerns in the neighbourhood was desirable in the interests of coal conservation, cheaper gas, and the safeguarding of capital in the face of competition. He was glad to say that terms had been provisionally arranged with the Oakengates Gas Company, and that it was the intention of the Board to call together the Wellington stockholders to consider the proposal. The Wellington works were advantageously situated for economical gas manufacture. Mr. R. J. Milbourne (who seconded the adoption of the report and accounts) said the new gas plant which had been installed was working exceedingly well. There were no residuals; but if the yield of gas compensated for the loss of residuals, there was a distinct advantage, inasmuch as they would have no bye-products to deal with or handle. The amalgamation which was suggested with the Oakengates Gas Company was an important matter. In a geographical sense, the two Companies were closely connected, and he considered it would be a distinct advantage to the Companies and the consumers for the undertakings to be merged.

**Exeter Gas-Light and Coke Company.**—At the annual meeting of the Company on the 28th ult., the Chairman (Mr. G. Hardy Harris) said that the Company intended asking the Board of Trade that the anomaly should be done away with which had arisen through the war, whereby gas was supplied to customers at an unremunerative rate. The Company were in a good position, having regard to the general state of gas undertakings. At the end of the year, the Directors found themselves able to pay the maximum dividend; and the price of gas had not been increased during the twelve months. It had risen from 2s. 4d. in 1914 to 4s. 8d. at present; whereas wages had increased by 300 p.ct., and coal by 250 p.ct. The sale of gas showed an increase of over 11 million c ft. as compared with the previous year.

The Book of the Season

OUR New Season's Booklet is now ready. The comprehensive nature of its contents will make it exceedingly useful in your Showrooms.

Contains details of the latest developments in domestic Gas Appliances.

Send for copies.

R. & A. MAIN, LTD.
EDMONTON, FALKIRK, &c.

## Cheltenham Gas Company.

The annual meeting of the Company was very animated, in consequence of the inability to pay a dividend. The report [*ante*, p. 562] showed a deficit of £5821, and stated that the principal cause was the strike of workmen in July last, and the acceptance of the demands of the Union, which involved also a substantial increase in the price of gas. Considerable dissatisfaction was expressed by shareholders; and the Directors' action in regard to the strike was severely criticized—it being urged that the Board should have called the shareholders together for an expression of their opinion, and that some attempt should have been made to keep the works going. It was also suggested by several speakers that a change in the directorate was necessary, and that some present members should be replaced by younger and more business-like men. All the Directors retired, but offered themselves for re-election; and there were five other nominations. The result of the election (which was by ballot and proxies) was that all the old members of the Board were returned. Five representatives of the shareholders were appointed to confer with the Directors as to the future policy of the Company. The Chairman (Mr. R. Ticehurst) said that as yet the Company had failed to benefit by the rise in the price of gas; and the effect could not be ascertained until after the March accounts. Should the Company show an improvement as a result of the change, it would be possible, perhaps, to declare a back-dividend for the previous term.

**Elland Gas Company.**—At the annual meeting of the Elland-cum-Greetland Gas Company, the Chairman (Mr. S. B. Beaumont), after approval had been given to the statutory dividend of 5 p.ct., reported that coal had cost £4325 more than in 1919; and the carriage of coal had increased from 2s. per ton pre-war to 5s. 2d. per ton. The future position of coal was most difficult to forecast; but gas companies hoped to receive it in cleaner condition than during the past few years. The wages expenditure had increased by £4234 on the previous year—an increase of nearly 6½d. per 1000 c.ft. of gas sold.

**Blyth Gas Company's Good Position.**—The annual meeting of the Blyth Gas Company was held recently, when Mr. Alexander Watt (the Deputy-Chairman), who presided, said that a large amount of deferred work had been undertaken, particularly in respect to main and service renewals—many of the latter being found to be in a serious state of decay. The result showed-up well in the greatly reduced amount of unaccounted-for gas. The plant on the works had also received special attention; and, where necessary, additions and renewals had been carried out. The profit on the year's working was £5918. While during the last half of the year the price charged for gas was at the pre-war rate of 2s. 4d. per 1000 c.ft., the Directors had since had to increase it to 3s. 4d. The make of gas had been 14,113 c.ft. per ton of coal carbonized. Mr. A. C. Hovey, of Newcastle-on-Tyne, complimented the Company on the general position of the undertaking. The statutory dividend was declared.

## Hastings and St. Leonards Gas Company.

The favourable results shown by the accounts for the six months to Dec. 31 were attributed by the Directors, in the report adopted at last week's meeting of the Company, primarily to three unforeseen causes—the use of coal from stock during the coal strike, an increased sale of gas, and an exceptional return from residuals. There was, as a matter of fact, an increase of 9·7 p.ct. in the sale of gas, as compared with the corresponding half of the previous year, and an increased number of consumers and of appliances on hire. Numerous consumers purchased appliances on hire; and there was a considerable sale of heating and cooking apparatus. Labour costs in the half year were £16,518, as compared with £6638 in the same period of 1914. Though not the maximum, this is equal to 1s. 5·68d. per 1000 c.ft. on the gas sold, and constitutes a heavy tax on the consumer, and, with the reduced hours of working and some inefficiency, a problem for the management. The re-consideration of plant and methods becomes necessary to meet these changed conditions. Good progress with the deferred renewals and repairs of the plant has been made; but the arrears of war-time have not yet been overtaken, and considerable inconvenience has been caused by the non-delivery of material on order. By September, a very considerable stock of coal had been accumulated. The coal strike, with the suspension of supplies, naturally depleted this; and there has also been trouble with spontaneous combustion. The general quality of coal still leaves much to be desired; and the immediate future as to the supply and price of coal is full of complexity. Dr. G. G. Gray, J.P., who presided, said the increase in gas sold was practically 20 million c.ft. Dividends were declared (less income-tax) at the prescribed rates of 3⅜ p.ct. per annum on the 5 p.ct. converted stock, 2⅝ p.ct. per annum on the 3½ p.ct. converted stock, and 3¾ p.ct. per annum on the 5 p.ct. additional stock.

**London County Council and Gas Charges.**—The report of the Public Control Committee dealing with the powers of charge of the Gas Light and Coke Company, portions of which were reproduced on pp. 563-4 of last week's "Journal," was received at the last meeting, on the 1st inst., of the London County Council, and the recommendations agreed to without debate.

**Gloucester Gas Light Company.**—The report adopted at the half-yearly meeting of the Company stated that the working for the six months had been satisfactory; and while large advances had taken place in the cost of materials and labour, the increase in the proceeds from the sale of gas and residual products had also been proportionate. The water gas plant was completed a few days before Christmas, and had since materially assisted in the supply of gas. A recent inspection assured the Directors that they had a plant which reflected credit on the Engineer (Mr. W. S. Morland), the makers, and all concerned. The Directors recommended the payment of the maximum statutory dividend, at the rate of 5 p.ct. per annum (less income-tax) upon the consolidated stock.


ROTARY SCRUBBER WASHERS

MADE TO SUIT ALL REQUIREMENTS. LATEST IMPROVEMENTS.

R. & J. DEMPSTER, LTD., MANCHESTER.

LONDON OFFICE: 34, VICTORIA STREET, WESTMINSTER, S.W. 1.

**Lurgan Gas-Works Loan.**—The Lurgan Urban District Council have agreed to ask the Local Government Board for Ireland for a loan of £15,000 for the repair of retorts and the erection of a carburetted hydrogen plant as an auxiliary, and for use during the closing-down of the retorts for repair.

**Salisbury Gas Light and Coke Company.**—It was stated at the half-yearly meeting of the Company that the good results presented had been brought about by the excellent, clock-like working of the new plant, and the efficient manner in which the Manager (Mr. W. Fielden) had conducted the business. More gas had been made out of every ton of coal, and more coke of a better quality for sale; while there had been a general saving in the cost of production all round. The net balance carried to the profit and loss account was sufficient to pay full statutory dividends and the interest on a temporary overdraft. The Manager reported that they had now one of the finest retort-houses in the country.

**Hornsea Gas Light and Coke Company, Ltd.**—The annual meeting of the Company was held last Saturday week, when Mr. Thomas Johnson (Chairman), in moving the adoption of the report and accounts, congratulated the shareholders on the continued progress of the undertaking. During the year, several improvements and additions to the plant at the works had been completed which, owing to the war, had had to be postponed. A dividend of 8 p.ct. (free of tax) was declared; and a resolution was adopted to increase the capital of the Company. At the close of the meeting, Mr. T. Hornsey, the Secretary, was presented with a cheque, subscribed for by the shareholders as a mark of their esteem and appreciation of his services as Secretary of the Company during the past fifty years.

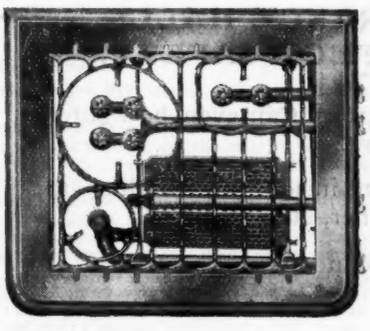
**Small Capital at Sunderland.**—Moving the adoption of the report and accounts at the annual meeting of the Sunderland Gas Company, Alderman W. F. Vint said that during the year they had been able to reduce the price of gas by 9d. per 1000 c.ft. to 1s. 6d., which was without doubt the cheapest in the kingdom. But, unfortunately, the market for residuals had dropped, due to a large extent to the miners' strike, which closed-up the foreign markets to British coalowners. As a result of this the Company had had to raise the price of gas by 1s. per 1000 c.ft. The reason they could afford to sell their gas so cheaply was that the capital of the Company was so small, and only £14,000 was necessary to pay the full dividend for the year. The volume of business had very much increased; but their expenses, also, had increased alarmingly. In 1914, 1s. 0½d. worth of coal was used to produce 1000 c.ft. of gas; while now 2s. 8¾d. worth of coal was required. Wages paid in 1914 represented 4d. for every 1000 c.ft. of gas; to-day they were paying 1s. 5d. At the conclusion of the meeting there was offered for sale £20,000 of 6 p.ct. ordinary stock in the Company, authorized under the recent Act. Bidding began at £90 p.ct., and reached £93, at which figure a quarter of the stock changed hands. At £92 nearly £5000 worth was sold; and the remainder was disposed of at £90 p.ct.

**Ilkeston's Increased Prices.**—Opposition was forthcoming at the last meeting of the Ilkeston Town Council to a proposal of the Committee to increase the price of gas by 10d. per 1000 c.ft.; and an amendment was moved for the reference of the matter back for further consideration. This, however, was rejected by a substantial majority; the advance being confirmed.

**An Honorarium at Redhill.**—Dealing with the past year's working, the Chairman (Mr. W. Lees Stenning) was able to report at the meeting of the Redhill Gas Company that for the first time the make of gas had exceeded 200 million c.ft. per annum; and that during last December their previous record in daily output was beaten on many occasions. The whole of the works were in operation to the utmost capacity; and they considered themselves fortunate that they had come through this difficult period without at any rate a partial failure. By the sale to consumers of apparatus previously purchased for hiring purposes; the capital employed had actually been reduced during the last three years by £1448. In the year under review £1097 was so credited. The meeting unanimously agreed, on the proposition of Mr. Charles Webb, that an honorarium of 250 guineas should be paid to Mr. W. H. Bennett, the Managing Director, for his past services. There was, declared Mr. Webb, no man more entitled to some recognition on their part, to show that they were gratified at his able management. The Chairman added that they all appreciated what Mr. Bennett had done for the Company. There was also a presentation of a gold watch to Mr. W. Norris, who has severed his connection with the Company after twenty years of faithful service. The dividend declared was 3¾ p.ct. per annum, less income-tax.

**York Gas Company and the Corporation.**—Regret was expressed by the Chairman (Mr. Alfred Procter), at the annual meeting of the York Gas Company, that, in spite of satisfactory accounts and an expanding business, the stockholders could not receive more dividend than the meagre rate of 3 p.ct. The payment of this dividend would leave £15,162 to be carried forward. Referring to the increased receipts from residuals, he said that, by the special efforts of Mr. H. E. Bloor (the Engineer), they managed to obtain a licence to export a small parcel of coke, which brought in a very satisfactory sum. The demand for appliances of all kinds had been gratifying throughout the year, and was a sure indication that gas was steadily gaining ground in public favour as a necessary adjunct of domestic economy and comfort. In connection with a Corporation housing scheme, the Company had offered to lay the mains if the Council would equip the houses with certain gas appliances which the Company would supply at cost price. This offer had been refused, on the ground that the Council would not compel their tenants to use gas. To the Company this appeared to be a distinctly retrograde step, and directly contrary to the best modern views on certain national and domestic questions of great importance. Mention was made by the Chairman of the good work done by Mr. Bloor on the National Gas Council and allied organizations; and also of the death of Mr. Henry Blain, the Assistant Secretary, who had spent 44 years in the Company's service.


# The Davis No. 118 (In two sizes)



**Efficiency Hot Plate**

**White Enamelled Door**

**Green Enamel Exterior**

**The Davis Gas Stove Co., Ld.**

SALES DEPT. **60, Oxford Street, London, W. 1.**

# PARLIAMENTARY INTELLIGENCE.

## HOUSE OF LORDS.

### Progress of Bills.

The further Standing Orders applicable to the following Bills have been complied with: Wandsworth, Wimbledon, and Epsom District Gas, Tendring Hundred Water and Gas.

The South Metropolitan Gas Bill, Waltham and Cheshunt Gas Bill: Read a second time and committed.

The Waltham and Cheshunt Gas Bill and the Nelson Corporation Bill are among a number of Bills to be considered by the following Select Committee, who will sit to-day [Wednesday]: Lord Clinton (Chairman), Earl Lucan, Earl Chichester, Lord Ebury, and Lord Sudley.

## HOUSE OF COMMONS.

### Progress of Bills.

The Cardiff Gas Bill, Swansea Gas Bill: Read a second time and referred to the Examiners.

The Batley Corporation Bill, Colne Corporation Bill, Leicester Corporation Bill, Burnley Corporation Bill, Wigan Corporation Bill: Read a second time and committed.

Requisition has been made to withdraw a petition against the Radcliffe and District Joint Gas Board, by the Manchester Corporation.

### Public Utility Companies (Capital Issues) Act.

Copies were presented of reports upon applications to the Board of Trade under the Public Utility Companies (Capital Issues) Act by the Aldershot Gas, Water, and District Lighting Company, British Gas Light Company, Ltd., Hitchin and District Gas Company, Knottingley Gas Company.

### Coal Mines (Decontrol) Bill.

A Bill to curtail the duration of and amend the Coal Mines (Emergency) Act, 1920, was presented last Friday by Mr. Bridgeman, supported by Sir Robert Horne, Mr. Baldwin, and Sir Philip Lloyd-Greame.

### Municipal Employees.

Dr. Macnamara, in reply to a question by Mr. Swan, said that, according to the returns to the Ministry of Labour, the total number of persons employed in municipal gas, water, electricity, tram, and general services was 575,000 at November last, as compared with 407,000 at November, 1918.

---

The Perth Town Council, at a special meeting, decided to borrow £20,000 for working capital of the gas undertaking.

**Production Plant at Thirsk.**—The annual report of the Thirsk Gas Company recommends a dividend of 2¾ p.ct. on the £12,000 share capital, making, with the interim dividend for the half year ended June, 5 p.ct. for the year. The Directors' report on the completion of a new system of gas production and the installation of plant and buildings costing £2448.

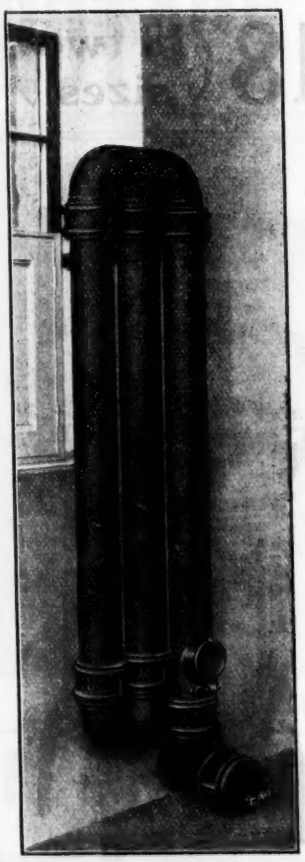
**Herne Bay Gas Company's Electrical Powers.**—It is stated in this week's electrical papers that the Herne Bay Urban District Council have informed the Electricity Commissioners that they have no objection to the revocation of the powers of the Gas Company with regard to the supply of electricity, on condition that the words "and electricity" are deleted from the Company's registered name.

**Dublin Gas Supply.**—At last week's meeting of the Blackrock (co. Dublin) Urban Council, Mr. W. Field proposed a resolution, which was passed, expressing dissatisfaction at the quality of gas supplied to the township by the Alliance and Dublin Consumers' Gas Company. He said the matter was one of great importance to the people there; and he hoped the Company would give immediate attention to the representation that was being made to them.

**West's Gas Improvement Company War Memorial.**—On Thursday of last week the Lord Mayor of Manchester (Alderman William Kay) unveiled a war memorial at the works of West's Gas Improvement Company, Ltd. The memorial consists of a handsome oak framing, on which the names of those who served in the forces (some 230 in all) are painted in gold letters. The ceremony, at which Mr. John West presided, took place at noon, and the whole of the staff and employees were present.

**Uxbridge, Wycombe, and District Gas Company.**—Mr. H. E. Jones, presiding at the annual meeting, said the acquisition of the Wycombe Gas Company's undertaking had now been carried out, and they were proceeding to take possession. The effect of this acquisition upon the business of the Company would in the future be considerable. Comparing the works with those of even much larger companies, the results of Mr. C. Hulme (Engineer and Manager) were as favourable as any of them. In fact, he had developed the whole thing as well as could be expected. A dividend was declared on the consolidated stock at the rate of 3½ p.ct., less income-tax.

**Romford Gas and Coke Company, Ltd.**—The Directors were able to report at the half-yearly meeting an increase in the sale of gas of 8·18 p.ct., compared with the corresponding period of 1919. There remained, after meeting interest and other charges, a net balance of £6644, out of which dividends were declared of 4½ p.ct. on the original shares and 3 p.ct. on the "B" shares, both less income-tax. These payments would leave a sum of £4787 to be carried forward. Application has been made to the Board of Trade for their consent under the Public Utility Companies (Capital Issues) Act, 1920, for the issue of redeemable or irredeemable preference capital, in lieu of the ordinary share capital now authorized but unissued, and also for consent to increase the borrowing powers of the Company.

# The ROBINSON-DEIGHTON Safety Heat and Light Tubes

**FOR HEAT AND LIGHT IN GARAGES, ENTRANCE HALLS, Etc., WITH PERFECT SAFETY.**

No open flames to ignite petrol. Can even be lighted from outside if necessary.

No products of combustion inside the building to injure bright metal, leather, etc.

No waste of gas—absolute economy—all heat used.

No difficulty in fixing.

Can be supplied in various sizes.

Made of strong cast iron.

*Prices and further particulars on application from :—*

**WILSONS & MATHIESONS, Ltd.,**

**CARLTON WORKS, ARMLEY, LEEDS.**

## Tunbridge Wells Company and the Southborough Gas-Works.

A contract has been entered into between the Directors of the Tunbridge Wells Gas Company and the Southborough Urban District Council for the purchase by the Company of the Southborough gas undertaking; and after the recent annual meeting of the Company, a resolution was passed by the proprietors approving of application being made to the Board of Trade for the necessary power to extend the Company's limits of supply. At the meeting, the Chairman (Alderman W. H. Delves) said that they had now authority to issue £20,000 of debenture stock at 7 p.ct., and would do so as opportunity offered. With the proposed purchase of the Southborough gas undertaking they would secure some additional profits. Last year's profit amounted to £13,463. During the past twenty years, the Directors had only increased the capital by £15,000. There was, he mentioned, an idea for making the consumers and shareholders partners; one-half the profits going back to the consumers, and the other half being divided between the employees and the shareholders. This would take the place of the sliding-scale arrangement, which worked very well before the war. During the year, good prices for residuals had enabled them to meet the increased cost of labour; last year's wages and salaries bill being £26,622, compared with £21,128 in 1919, and £12,187 in 1914. In 1914 the 640 share and debenture holders, who found the £190,000 capital and took all the risk, shared a net dividend of £13,352; and in 1920, of £5913. Payment was ordered of 7½ p.ct. dividends on the ordinary stock, 5⅝ p.ct. on the "B," and 5¼ p.ct. on the "C" and "D." Mr. Donaldson congratulated the Chairman on having served fifty years on the Board of Directors.

**Stokers' Advance at Sowerby Bridge.**—After a consultation between the Sowerby Bridge Gas Committee and the local branch of the Gas Workers' Union, the Council have decided to advance the rates of pay of gas stokers from 4s. 2d. to 4s. 9d. per shift, and to give an increase of ¼d. per hour to all other men at the works.

**Gas Deficit at Omagh.**—Mr. A. D. Price, an Inspector under the Local Government Board for Ireland, held an inquiry at Omagh (co. Tyrone), in regard to a proposal of the Urban Council to obtain a loan of £3000 to meet a deficit in the working of the gas undertaking. It was stated that the cost of production was 9s. 6d. per 1000 c.ft.; while the charge to consumers was only 6s. 8d.

**Salaries at Leeds.**—At a special meeting of Chairmen and Deputy-Chairmen of Leeds Corporation Committees, last Thursday, it was decided unanimously that the whole question of salary advances for all the higher-paid Corporation officials should be postponed for six months. The decision affects the heads of the various departments and all the secondary officials whose present salaries exceed £400 per annum. Staffs receiving less than £400 have been regraded recently; and the new scale comes into operation in April.

**High-Pressure Plant for Leighton Buzzard.**—A dividend of 3¾ p.ct. per annum was declared at the meeting of the Leighton Buzzard Gas Company, when the Chairman (Mr. R. Richmond) regretted that this was all they were for the present authorized to pay. The present capital, including debentures, was equal to only £469 per million c.ft. of gas sold. The creation of a further £4500 of 6 p.ct. debentures was sanctioned. To obviate the cost of laying a lot of new mains, the Company are proposing to instal a pressure-raising plant at the works, to improve the supply. The cost of this, with the necessary mains, will be at least £3000.

**Blackpool Gas Surplus.**—Mr. W. Chew (the Gas Engineer) has reported to the Blackpool Town Council that the past year has been a difficult one; increased costs having sent-up the expenditure to a high figure. The consumption of gas has been a record, with the result that, instead of there being no balance profit, there will be an approximate surplus of £4050. For the previous year, the gas profits were about £6000; and £3000 went to rate relief, and £2960 to the reserve funds. The allocation of this year's £4000 will be a matter for later decision. Next year's estimates anticipate a surplus of only £600; for, though the revenue is expected to be £2000 more, the expenditure is put at £4000 more.

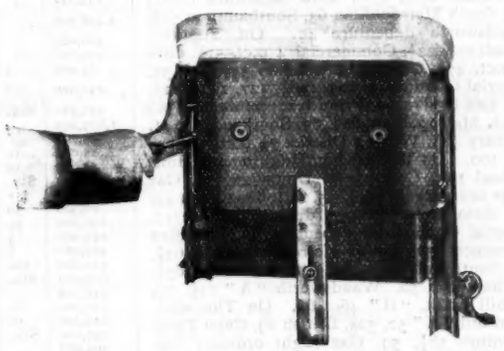
**Irish Curfew Regulations.**—The extension, as from Friday last, of curfew hours in Dublin to 9 p.m., under military order, imposes great hardship on all classes of citizens and on many industries. Among the public services affected, not the least important is that of the Alliance and Dublin Consumers' Gas Company. Hitherto, with curfew beginning at 10 p.m.—for some time it began at midnight—things were not so bad, though consumption was necessarily somewhat reduced by the early closing of shops and the retirement of households; but the additional hour makes further inroads, and compels a considerable reduction in gas consumption. The Gas Company have had to re-arrange their night shifts to meet the new conditions. In Cork, the lighting position has been very gravely affected by the curfew regulations, which now take effect at 6 p.m., and last until 3 a.m.; and Belfast, Londonderry, Limerick, and smaller centres are equally affected.

**Worthing Gas Company.**—The Directors were able to report to the proprietors that considerable economy in working expenses had resulted from the introduction of new stoking machinery, which had been in use during the latter part of the past half year. Further capital will be needed to meet the balance of expenditure in connection with this machinery, to provide new trunk mains, and for other necessary outlay on capital account. The Directors have therefore made application to the Board of Trade—under the Public Utility Companies (Capital Issues) Act, 1920—for consent to raise further loan capital. The profit and loss account showed a balance of £19,492. Out of this sum, the Directors recommended the declaration of a dividend at the authorized rate of 3¾ p.ct. per annum (less income-tax) upon the consolidated ordinary stock of the Company, carrying forward £16,904. The Chairman (Mr. William Cash) said if the cost of living came down, wages must come down, and the rate of production must be increased. He referred to the serious illness suffered by Mr. S. O. Stephenson (the Engineer and General Manager), and expressed the pleasure of the Board at seeing him back again.

RICHMOND'S
"Rosette"
GASFIRE.

Constructed to overcome the difficulties in obtaining a perfect fit for a modern Gasfire in the varying shapes of existing coal grates from which the front bars have been removed.

Our long experience of modern Gasfire invention has proved the need there is for a really high-class Gasfire of this type.



By simply loosening a screw at the back of each leg the Gasfire can be raised or lowered to the extent of 4 inches, according to the height of the bottom of the coal grate.

THE RICHMOND
GAS STOVE & METER CO., Ltd.
WARRINGTON —— and —— LONDON

**Winchester Water and Gas Company.**—A general meeting of the Company was held on the 23rd ult.—Mr. J. C. Warner presiding. Moving the adoption of the report, the Chairman said the revenue account showed the largest sale of gas ever recorded by the Company in a December half year. There had been an increase in the receipts from the sale of gas of £1937. The revenue increase amounted to £1520. Wages, however, had increased by £693. In 1913 they stood at £3572; but since then they had gone up to £9233. So it was easy to see how the profits had disappeared. Coal again had increased by £2754, and rates by £640. The actual result, which was most disappointing to the Directors, was that the sum carried to the credit of the profit and loss account was only £1381. Prior to the war, their business was showing a net profit of between £5000 and £6000 each half year. The balance of £1381 would not be sufficient to pay the dividends recommended; but fortunately they had a reserve fund. Dividends of 4 p.ct. per annum on the preference stock and 4½ p.ct. per annum on the consolidated ordinary stock were declared.

**Teignmouth Gas-Works Improvements.**—The Gas Committee recommended the Teignmouth Town Council last week that, in addition to spending £848 on the installation of a booster pressure-raising plant, and weighbridge at the gas-works, the tender of Messrs. Willey, of Exeter, be accepted for the erection of a relief gasholder for the sum of £2548, providing sanction is obtained from the Ministry of Health to a loan of £3000 for the purpose. The Council were also asked to approve of applications for loans of £1040 for the purchase of an exhauster and condensers, and £3500 for the renewal of gas-mains. Mr. J. J. Carver moved the deletion of the minutes relating to the relief gasholder, exhauster, and condensers. He thought the time was not opportune to apply to the Ministry of Health. Mr. F. H. Rogers, in seconding, declared it to be an utter absurdity to ask for a loan. The Gas Manager (Mr. H. Higham) explained that the work recommended would effect an economy in gas production. The supply would be made more constant, and give better satisfaction to the town. The amendment was lost, and the report adopted.

## STOCK MARKET REPORT.

The general tone of things on the Stock Exchange last week showed scarcely any change. Happily, however, prices at the close were above the worst of the week.

The gilt-edged market had a chequered career. Home Government issues opened well, and held on through Tuesday; then they sustained a check and lost their rise. Friday's figures for the big four were: Consols 46-46⅝, War Loan 85⅞-85⅝, Funding 70¾-70⅝, Victory 75⅞-76½. Bonds held their own fairly firmly, and corporation issues were steady. Home Rails had a long lane of falling prices, but found a turning on Friday. Canadian and Argentine were not remarkable.

The Miscellaneous Market was very weak. In Oils and Industrials there were one or two exceptional rises; but Rubbers were all lower. Shipping and Textiles fell.

Business in the Gas Market showed good average activity, and was more evenly distributed. The general tendency was firm. In the London Companies, Gas Light ordinary and maximum and South Metropolitan rose 1 each. Suburban were almost unchanged; but in Provincials advances were scored by Newcastle, Sheffield, South Shields, and Tynemouth. In Continentals, Union fell 5; but Imperial had a phenomenal rise of 34—being a revaluation of the undertaking having regard to the position of its claims against Germany. The debenture stock quotation was at the same time reduced by 22.

Bargains done for cash during the week were as follows: On Monday, Brentford "A" 52, 52½, ditto "B" 49, 49½, 51½, Commercial 3½ p.ct. 47½, 48, Gas Light ordinary 54½, 54⅞, 55, ditto maximum 41½, ditto debenture 47, Hong Kong 8⅞, Imperial Continental 123¾, 125, 127, Monte Video 71, 71½, Primitiva 10s., ditto preference 24s., 25s., ditto debenture (1911) 37½, South Metropolitan 63, Southampton 55½, Wandsworth debenture 40. On Tuesday, British 21¾, 22½, Commercial 4 p.ct. 51½, ditto 3½ p.ct. 47½, Gas Light ordinary 54½, 54⅞, 55, Imperial Continental 125, 126½, 127, 127½, 128, 129, Lea Bridge 60, Primitiva preference 23s., South Metropolitan 62⅝, 63, Southend 5 p.ct. ordinary 46½, Woking District 7¼ p.ct. debenture 100. On Wednesday, Brighton and Hove original 100, Continental Union 20, 21, Gas Light ordinary 54, 54¼, 55, ditto maximum 41, 41½, ditto preference 57, ditto debenture 47, Imperial Continental debenture 70, Primitiva preference 25s., South Metropolitan 62½, 63¼, 63½, South Suburban 57, ditto debenture 65⅝, Southampton 56, Wandsworth "A" 74½, 75, Redhill 5 p.ct. "B" 46, 46½. On Thursday, Brentford "A" 52, 52½, British 23, Cape Town debenture 58½, 59, Gas Light ordinary 54½, 54⅝, 55, 55⅝, 55½, ditto debenture 47, 47½, Hong Kong 8⅞, Imperial Continental 156, 157½, ditto debenture 70½, 71, Primitiva 8s. 11¼d., ditto preference 24s., 24s. 10½d., 25s., 25s. 3d., South Metropolitan 62, 62½, 63, Tottenham "B" 51, 51½, 52. On Friday, Bournemouth 5 p.ct. 7½⅛, Brentford "B" 51, 51½, European 5⅜, Gas Light ordinary 54½, 54⅝, 54¾, 55, Imperial Continental 155, 155½, ditto debenture 70½, 71, Monte Video 70½, South Metropolitan 62⅝, 63, 63½, Eastbourne "A" 63½, 64, ditto "B" 49½, 50, Hartlepool 5 p.ct. 66, Reading 5½ p.ct. 49½, 50.

In the Money Market, by contrast with the preceding week, a condition of marked ease set in at once, and continued to the close—supplies being fully equal to meeting the considerable demands for accommodation. Discount was active upon easier terms. Silver gave way, and had a progressive fall, touching the figure of 30⅝d. The Bank rate remains at the 7 p.ct., fixed on April 17 last.

### ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

| Issue. | Share. | When ex-Dividend. | Ante-War Dividend & Bonus. | Last Dividend. | NAME. | Closing Prices, July 30, 1914. | Present Prices. | Lowest and Highest Prices of Bargains. |
|---|---|---|---|---|---|---|---|---|
| £ | | | p.c. | | | | | |
| 182,049 | Stk. | Aug. 27 | 4 | 4% | Aldershot 4 p.c. Pref. | ... | 53—58 | ... |
| 1,551,868 | ,, | Oct. 14 | 2½ | 3½% | Alliance & Dublin Ord. | 59—64 | 38—43 | ... |
| 374,000 | ,, | Jan. 13 | 4 | 4% | Do. 4 p.c. Deb. | 76—79 | 47—52 | ... |
| 280,000 | 5 | Oct. 28 | 7½ | 8% | Bombay, Ltd. | 5½—6½ | 4—4½ | ... |
| 100,000 | 5 | Feb. 25 | 16 | 5% | Bournemouth Gas and Water: B 7 p.c. | ... | 8—9* | 7⅛ |
| 383,110 | 10 | ,, | 7 | 7% | Bournemouth Gas and Water: Pref. 6 p.c. | 13½—14 | 7½—8½* | ... |
| 115,000 | 10 | ,, | 6 | 6% | Bournemouth Gas and Water: 4 p.c. Deb. | ... | 55—60 | ... |
| 162,065 | — | Dec. 30 | — | 4% | Brentford A Consolid. | 261—266 | 50—55* | 52—52½ |
| 992,045 | Stk. | Feb. 25 | 14 | 30/- | Do. B New | 204—209 | 47—52* | 49—51½ |
| 734,920 | ,, | ,, | 11 | 26/3 | Do. 5 p.c. Pref. | 109—111 | 68—73* | ... |
| 55,000 | ,, | ,, | 5 | 5% | Do. 4 p.c. Deb. | 91—93 | 57—59 | ... |
| 221,400 | ,, | Dec. 15 | 4 | 4% | Brighton & Hove Orig. | 208—213 | 100—110 | 100 |
| 214,775 | ,, | Aug. 27 | 11 | 7½% | Do. A Ord. Stk. | 154—159 | 70—80 | ... |
| 244,200 | ,, | ,, | 8 | 5½% | Bristol 5 p.c. max. | ... | ... | ... |
| 1,287,500 | Stk. | July 29 | 5 | 5% | British | 44—45 | 21—23 | 21½—23 |
| 530,000 | 20 | Sept. 15 | 12½ | 10% | Do. 4 p.c. Deb. Stk. | 88—90 | 50—55 | ... |
| 120,000 | Stk. | Dec. 30 | 4 | 4% | Buenos Aires 4 p.c. Deb. | 85—87 | 37—40 | ... |
| 245,771 | ,, | ,, | 4 | 4% | Cape Town & Dis., Ltd. | 1¼—2½ | 7—7½ | ... |
| 100,000 | 10 | May 27 | — | — | Do. 4½ p.c. Pref. | 4—6 | 5—6 | ... |
| 100,000 | 10 | Dec. 10 | — | 4½% | Do. 4½ p.c. Deb. Stk. | 70—75 | 55—60 | 58½—59 |
| 100,000 | Stk. | Dec. 30 | 4½ | 4½% | Chester 5 p.c. Ord. | 108—110 | ... | ... |
| 157,150 | ,, | Feb. 26 | 5 | 5% | Commercial 4 p.c. Stk. | 106—108 | 51—54* | 51½ |
| 1,513,280 | ,, | Feb. 25 | 5/9/4 | 30/- | Do. 3½ p.c. do. | 103—105 | 47—52* | 47½—48 |
| 560,000 | ,, | ,, | 5½ | 26/3 | Do. 3 p.c. Deb. Stk. | 69½—71½ | 42—45 | ... |
| 475,000 | ,, | Dec. 15 | 3 | 3% | Continental Union Ltd. | 76—79 | 20—25 | 20—21 |
| 800,000 | ,, | Dec. 11 | 4 | 4% | Do. 7 p.c. Pref. | 115—118 | 30—40 | ... |
| 200,000 | ,, | ,, | 7 | — | Croydon A 10 p.c. | ... | 120—130* | ... |
| 51,600 | ,, | Feb. 5 | 15 | 10% | Croydon B and C 7 p.c. | ... | 90—100* | ... |
| 278,400 | — | ,, | 12 | 7% | Derby Con. Stk. | 123—125 | ... | ... |
| 492,270 | Stk. | ,, | 6 | 4½% | Do. Deb. Stk. | 102—104 | ... | ... |
| 55,000 | ,, | — | 4 | 4% | European, Ltd. | 17½—18 | 5½—6½ | 5⅞ |
| 1,002,180 | 10 | Jan. 29 | 10 | 5/0 | Gas Light and Coke: 4 p.c. Ord. | 98—102 | 54—57 | 54—55½ |
| 16,298,975 | Stk. | Feb. 10 | 4/17/4 | 30/- | Gas Light and Coke: 3½ p.c. max. | 76—79 | 39—42 | 41—41½ |
| 2,600,000 | ,, | ,, | 3½ | 26/3 | Gas Light and Coke: 4 p.c. Con. Pref. | 96—99 | 53—58 | 57 |
| 4,062,235 | ,, | ,, | 4 | 4% | Gas Light and Coke: 3 p.c. Con. Deb. | 72½—74½ | 45—48 | 47—47½ |
| 4,674,850 | ,, | Dec. 15 | 3 | 3% | Gas Light and Coke: 10 p.c. Bonds. | ... | ... | ... |
| 130,000 | ,, | Dec. 11 | 10 | 10% | Hastings & St. L. 5 p.c. | ... | 53—58 | ... |
| 82,500 | ,, | Sept. 15 | 5 | 3½% | Do. 3½ p.c. | 87—89 | 37—39 | ... |
| 258,740 | ,, | ,, | 3½ | 2½% | Hongkong & China, Ltd. | 16½—16½ | 8½—9½ | 8½—8⅞ |
| 70,000 | 10 | May 13 | 11 | 8% | Hornsey 7 p.c. | ... | 87—89 | ... |
| 86,600 | Stk. | Sept. 15 | 9 | 5½% | Ilford A and C | 151—154 | 77—81 | ... |
| 131,000 | ,, | Aug. 12 | 7½ | 4½% | Do. B | 115—118 | 57—62 | ... |
| 65,780 | ,, | ,, | 6½ | 3½% | Do. 4 p.c. Deb. | 92—94 | 54—56 | ... |
| 65,500 | ,, | Dec. 30 | 4 | 4% | Imperial Continental | 150—160 | 155—160 | 123¾—157½ |
| 4,940,000 | ,, | ,, | 9 | 4½% | Do. 3½ p.c. Deb. Red. | 84—86 | 68—73 | 70—71 |
| 1,235,000 | ,, | Feb. 10 | 3½ | 3½% | Lea Bridge Ord. 5 p.c. | 119—121 | 60—75 | 60 |
| 235,242 | ,, | Sept. 15 | 6½ | 5% | Liverpool 5 p.c. Ord. A. | 211—213 | ... | ... |
| 2,498,905 | ,, | Feb. 26 | 10 | 37/6 | Liverpool 5 p.c. Ord. B. | 146—148 | ... | ... |
| 306,083 | ,, | June 26 | 4 | 4%. | Do. 4 p.c. Pr. Deb. Stk. | ... | ... | ... |
| 165,736 | ,, | Feb. 25 | 7/5/6 | 3½% | Maidstone 5 p.c. | ... | 52—57* | ... |
| 75,000 | 5 | June 11 | 6 | 3% | Malta & Mediterranean | 4½—4½ | 1½—2½ | ... |
| 250,000 | 100 | Oct. 1 | 4½ | 4½% | Met. of Melbourne 4½ p.c. Deb. | 99—101 | 86—93 | ... |
| 541,920 | Stk. | Nov. 26 | 4 | 6% | Monte Video, Ltd. | 11½—12 | 68—73 | 71—71½ |
| 1,875,892 | ,, | Feb. 25 | 4½ | 3½% | Newcastle & Gatsh'dCon. | 98½—99½ | 58½—59½* | ... |
| 529,705 | ,, | Dec. 30 | 3½ | 3½% | Do. 3½ p.c. Deb. | 82—83 | 50—51 | ... |
| 15,000 | 10 | Sept. 15 | — | 8% | North Middlesex 10 p.c. | ... | 12½—13½ | ... |
| 55,940 | 10 | ,, | 7/14/0 | 5½% | ,, ,, 7 p.c. | 14—15 | 7—7½ | ... |
| 300,000 | Stk. | Nov. 26 | 8 | 8% | Oriental, Ltd. | 117—122 | 93—98 | ... |
| 60,000 | 5 | Mar. 26 | 10 | 1/- | Ottoman, Ltd. | 7½—7½ | 2—3 | ... |
| 60,000 | 50 | Feb. 25 | 13 | 7½% | Portsea Island, B | 128—131 | 65—70* | ... |
| 100,000 | 50 | ,, | 12 | 6½% | Do. C | 118—121 | 50—55* | ... |
| 249,980 | 5 | April 29 | 8 | — | Primitiva Ord. | 5½—6 | ⅛—⅜ | 8/11½—10/- |
| 499,960 | 5 | June 26 | 5 | — | Do. 5 p.c. Pref. | 4½—5 | 1½—1⅝ | 23/—25/3 |
| 521,600 | 100 | Dec. 1 | 4 | 4% | Do. 4 p.c. Deb. | 91—93 | 67—69 | ... |
| 600,000 | Stk. | Jan. 27 | 4 | 4% | Do. ,, ,, 1911 | ... | 37—40 | 37½ |
| 346,198 | ,, | Dec. 30 | 4 | 4% | River Plate 4 p.c. Deb. | 85—87 | 37—40 | ... |
| 150,000 | 10 | Sept. 30 | 6 | 6/- | San Paulo 6 p.c. Pref. | 10½—11 | 6½—7½ | ... |
| 125,000 | 50 | Jan. 3 | 5 | 5% | San Paulo 5 p.c. Deb. | 47—49 | 37—39 | ... |
| 135,000 | Stk. | Aug. 27 | 10 | 5% | Sheffield A | 223—224 | 66—69 | ... |
| 209,984 | ,, | ,, | 10 | 5% | Do. B | 222—224 | 66—69 | ... |
| 523,500 | ,, | ,, | 10 | 5% | Do. C | 220—222 | 63—65 | ... |
| 133,201 | Stk. | Sept. 15 | 4 | 4% | Shrewsbury 5 p.c. | ... | ... | ... |
| 90,000 | 10 | Sept. 30 | 9 | 9% | South African | 10½—11½ | 10½—11½ | ... |
| 6,609,895 | Stk. | Feb. 10 | 5/4/0 | 3% | South Met. Ord. | 111—113 | 62—65 | 62—63½ |
| 250,000 | ,, | Jan. 13 | — | 3% | Do. Red. Pref. | ... | 90—92 | ... |
| 1,895,445 | ,, | ,, | 3 | 3% | Do. 3 p.c. Deb. | 72½—74½ | 45—48 | ... |
| 224,820 | ,, | Feb. 25 | 8½ | 7½% | South Shields Con. Stk. | 157—159 | 86—88* | ... |
| 1,087,795 | ,, | ,, | 6 | 3½% | S'th Suburb'n Ord. 5 p.c. | 114—116 | 56—61* | 57 |
| 247,558 | ,, | Dec. 30 | 5 | 5% | Do. 5 p.c. Deb. Stk. | 116—118 | 65—70 | 65½ |
| 647,740 | ,, | Nov. 12 | 7½ | 3½% | Southampton Ord. | 99—102 | 55—58 | 55½—56 |
| 121,275 | ,, | Dec. 30 | 4 | 4% | Do. 4 p.c. Deb. Stk. | ... | 57—59 | ... |
| 120,000 | ,, | Feb. 25 | — | 3½% | Tottenham A 5 p.c. | 135—138 | 57—62* | ... |
| 782,275 | ,, | ,, | 6 | 2½% | Tottenham B 3½ p.c. | 115—117 | 50—55* | 51—52 |
| 181,255 | ,, | Dec. 15 | 4 | 4% | District 4 p.c. Deb. | 87—89 | 55—58 | ... |
| 182,380 | 10 | Dec. 30 | 5 | — | Tuscan, Ltd. | 5—6 | 1—2 | ... |
| 149,900 | 10 | July 1 | 5 | 5% | Do. 5 p.c. Deb. Red. | 93—95 | 45—50 | ... |
| 236,476 | Stk. | Feb. 25 | 5 | 3½% | Tynemouth 5 p.c. max. | 108½—109 | 68—70* | ... |
| 30,000 | ,, | Feb. 25 | 8½ | 47/6 | Wandsworth, Wimbledon, and Epsom—Wandsworth A 5 p.c. | 151—156 | 75—80* | 74½—75 |
| 255,636 | ,, | ,, | 6½ | 32/6 | Do. B 3½ p.c. | 129—134 | 53—58* | ... |
| 108,075 | ,, | ,, | — | 33/3 | Do. C | ... | 30—35* | ... |
| 140,865 | ,, | ,, | — | 33/3 | New Ordinary | ... | 30—35* | ... |
| 352,000 | ,, | ,, | 6½ | 26/3 | Wimbledon 5 p.c. | 117—122 | 43—48* | ... |
| 98,000 | ,, | ,, | 6½ | 32/6 | Epsom 5 p.c. | 121—126 | 50—55* | ... |
| 88,416 | ,, | Dec. 30 | 3 | 3% | 5 p.c. Deb. Stk. | 66—69 | 40—45 | 40 |

* Ex Div.

## APPLICATIONS FOR PATENTS.

**[Extracted from the "Official List" for March 2, 1921.]**

Nos. 5770 to 6543.

BOYS, C. V.—"Recording and integrating gas calorimeters." No. 6267.

BOARD OF TRADE, SECRETARY OF THE.—See Boys. No. 6267.

BRITISH MANNESMANN TUBE COMPANY, LTD.—"Method of jointing tubes." No. 6282.

CALVERT, G.—"Gaseous reactions." No. 6312.

CARRATT, A. J.—"Water-controlling devices for gas-producer plants, &c." No. 6065.

CHRISTENSON, O. L.—"Production of ammonium chloride in coking or distilling coal." No. 6313.

COPE, B. G.—"Atmospheric gas-burners, &c." No. 6391.

GILL, G. M.—"Method of making furnaces, coke-ovens, retort settings, &c." No. 6418.

HEDMAN, B. A.—See Christenson. No. 6313.

HEESCH, O. K.—"Automatic gas-meter." No. 5979.

KANSAS CITY GASOLINE CO.—"Cracking hydrocarbons." No. 6014-15.

METERS, LTD.—"Prepayment mechanism of gas, &c., meters." No. 6139.

MORLEY, J.—See Meters, Ltd. No. 6139.

MORTON, J.—See Gill. No. 6418.

PIERSON, J. & O. G.—"Gas-generators for generating low-grade gas." No. 6286.

REID, J. H.—"Production of gas and carbonaceous materials." No. 6010.

ROWELL, J. & R. H.—"Burners for gas fires, stoves, &c." No. 5867.

ROXBURGH, A. B.—See Rowell. No. 5867.

SADLER, H. S.—"Grids for gas purifiers, &c." No. 6133.

SEIGLE, A. A. F. M.—"Method of distilling and gasifying peat, &c." No. 6273.

SEIGLE, A. A. F. M.—"Transforming and distilling hydrocarbons." No. 6274.

SOMERVILLE, J. M.—"Gas lamps." No. 5892.

SOUTH METROPOLITAN GAS COMPANY.—See Somerville. No. 5892.

SOUTH METROPOLITAN GAS COMPANY.—See Gill. No. 6418.

TORFVERWERTUNGSGES, DR. POHL UND VON DEWITZ.—See Seigle. No. 6004.

TULLOCH, T. G.—"Fuel for gas-producers." No. 6532.

WATSON, J. H.—"Burners or fittings for incandescent gas mantles." No. 6492.

The Elland, Greetland, and Stainland District Council have appointed a Joint Committee to hold a watching brief in connection with the application of the Elland-cum-Greetland Gas Company for alteration in the Statutory Acts governing the Company's activities.

The Kendal Borough Treasurer has produced to the Corporation an estimate of the accumulated profits on gas account to March 31, showing a credit balance of £202 for the current year, and a balance of £2000 brought from the previous year—making a total of £2202.

At a large stone quarry between Mold and Wrexham some thousands of gallons of tar used in the manufacture of macadam were destroyed or damaged by fire, said to have been caused by a naked light coming in contact with the tar during acetylene welding operations which were in progress on a tank.

The fortieth annual dinner of the Newport (Mon.) Gas-Works Benefit Society was presided over by Mr. J. H. Canning, the Engineer and Manager. Lieut.-Col. A. H. Laybourne, responding to the toast of "The Chairman and Board of Directors," said that, when they talked of the Gas Company, they had to consider whether they meant the 350 employees, the 700 shareholders, or the 16,000 odd consumers in the town. At any rate, these figures showed the enormous number of people interested in their efforts and decisions; and they had to try as far as possible to hold the scales equally between the three interests. In conclusion, he spoke appreciatively of the services of Mr. Canning, and said he hoped he would continue to serve the Company as his father had done before him. Mr. T. H. Hazell, the Secretary of the Company, proposed "The Benefit Society," and eulogized the work carried on.


## THE THERM PRICE CALCULATOR

**(Protected.)**

A **SLIDE RULE** designed by Mr. H. R. ASKEW, Assoc.M.Inst.C.E., B.Sc. (Eng.), &c., for quickly and accurately converting "Price per Thousand" into "Price per Therm," and *vice versa*.

**AN INVALUABLE ADJUNCT TO EVERY GAS OFFICE.**

*For Description, see "JOURNAL," Jan. 12, p. 88.*

**Price 10/6, post free.**

Walter King, "JOURNAL" Offices, 11, Bolt Court, Fleet Street, LONDON, E.C. 4.


## NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

*No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.*

**COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON TUESDAY, to ensure insertion in the following day's issue.**

**Orders to Alter or Stop PERMANENT ADVERTISEMENTS should be received by the FIRST POST on Monday.**

**UNDISPLAYED ADVERTISEMENTS: Situations Wanted, Six Lines and under (about 36 words) 3s.; each additional Line, 6d. Situations Vacant, Apparatus Wanted and for Sale, Contracts, Public Notices, &c., 9d. per Line—minimum, 4s. 6d.**

**TERMS OF SUBSCRIPTION to the "JOURNAL."**

| | | ONE YEAR. | | HALF-YEAR. | | QUARTER |
|---|---|---|---|---|---|---|
| United Kingdom | Advance Rate: | 35/- | .. | 18/- | .. | 10/- |
| | Credit Rate: | 40/- | .. | 21/- | .. | 11/6 |
| Abroad (in the Postal Union) Payable in Advance | | 40/- | .. | 22/6 | .. | 12/6 |

In payment of subscriptions for "JOURNALS" sent abroad, Post Office Orders or Bankers' Drafts on London only are accepted.

All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C. 4.

**Telegrams: "GASKING, FLEET LONDON." Telephone: Holborn 6857.**


**OXIDE OF IRON**

FOR SALE OUTRIGHT, OR ON LOAN.

**SPENT OXIDE**

PURCHASED IN ANY DISTRICT.

**GAS PURIFICATION & CHEMICAL CO., LTD.,**
PALMERSTON HOUSE,
OLD BROAD STREET, LONDON, E.C.2.

**"VOLCANIC" FIRE CEMENT.**
Resists 4500° Fahr. Best for Gas-Works.
ANDREW STEPHENSON, Gresham House, Old Broad Street, LONDON, E.C. "Volcanism, London."

**TAR WANTED.**

BEFORE entering into an arrangement for the DISPOSAL of your Production, it will be to your interest to communicate with

**BROWNHILLS CHEMICAL WORKS CO.,**
near WALSALL.

**J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E. 1.**

WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS AND GOVERNORS.

REPAIRS RECEIVE PROMPT ATTENTION.

Telephones: 815 Oldham, and 2412 Hop, London.

Telegrams—
"BRADDOCK, OLDHAM," and "METRIQUE, LAMB, LONDON."

**TULLY GAS PLANTS, LTD.,**

SOLE MANUFACTURERS OF

TULLY'S Patent Carburetted Hydrogen Plant.

MILLGATE, NEWARK-ON-TRENT.

London Office: 39, VICTORIA STREET, S.W. 1.

**SULPHURIC ACID.**

SPECIALLY prepared for the manufacture of SULPHATE OF AMMONIA.

**SPENSER CHAPMAN & MESSEL, LTD.,**
with which is amalgamated WM. PEARCE & SONS, LTD.,
Mark Lane, LONDON, E.C. Works—SILVERTOWN.
Telegrams—"HYDROCHLORIC, FEN, LONDON."
Telephone—1588 AVENUE (3 lines).

**OXIDE OF IRON.**

SPENT OXIDE BOUGHT.

**BALE & CHURCH, LTD.**
33, ST. MARY AT HILL, LONDON, E.C.3.
Phone: Avenue 6680.

**"TORTO" FIRE CEMENT.**

**BALE & CHURCH, LTD.**
33, ST. MARY AT HILL, LONDON, E.C.3.
Phone: Avenue 6680.

**"KLEENOFF," THE COOKER CLEANSER.**

Tins for Sale to Consumers.
In Bulk for Works Use.

**BALE & CHURCH, LTD.**
33, ST. MARY AT HILL, LONDON, E.C.3.
Phone: Avenue 6680.

**INVENTIONS PATENTED. TRADE MARKS REGISTERED.**
Advice and Handbook free. 35 years' references. Gas Patents a Speciality. KING'S PATENT AGENCY, Ltd. (Director, B. T. King, A.I.M.E., British and U.S. Regd. Patent Agent), 146A, QUEEN VICTORIA STREET, LONDON, E.C. 4.

**CORRESPONDENCE TUITION in GAS ENGINEERING** for City and Guilds Institute Exams. (Preliminary and Final). Successful Results. Low Fees.
PENNINGTONS ENGINEERING TUTORS, 254, Oxford Road, MANCHESTER.

**ROBERT DEMPSTER & SONS, Ltd.,** Elland, Gas Engineers and Contractors for CARBONIZING PLANTS on Horizontal or Vertical Principles, and Stoking Machinery. HANDLING INSTALLATIONS, including Coal Breaking, Elevating, Conveying Plants and Coke Screening, Storing and Teipherage Plants. PURIFICATION.—All Branches of Wet and Dry Purification. STORAGE.—Gasholders, and all forms of Gas Apparatus. Wire: "Dempster, Elland." 'Phones: Elland 261, 262, 988.

**FIRTH BLAKELEY, SONS, & CO.,** LIMITED, 15, Park Row, Leeds. GAS-WORKS EXTENSIONS. When requiring Alterations or Additions to your Plant, please communicate with us before placing your orders. Gas Apparatus, Coke-Oven Plant, and Structural Steel Work our Specialities. Satisfaction guaranteed. Phone, 22,579 Leeds.

MEWBURN, ELLIS, & CO.,
**CHARTERED PATENT AGENTS AND** TRADE MARK AGENTS,
70 & 72, Chancery Lane, London, W.C. 2.
Telegrams: "Patent, London." Phone 243 Holborn.
And 3, St. Nicholas Buildings, Newcastle-on-Tyne.

**J. E. C. LORD (Manchester), Ltd.,** Ship Canal Tar Works, Weaste, Manchester. Pitch, Creosote, Benzols, Toluol, Naphtha, Pyridine, all kinds of Cresylic Acid, Carbolic Acid, Sulphate of Ammonia, &c.

**BRITISH GAS PURIFYING MATERIAL.**

ENGLISH BOG ORE AND NATURAL HYDRATED OXIDE OF IRON,
SPENT OXIDE BOUGHT.

**BRITISH GAS PURIFYING** MATERIALS CO., LTD.
(W. T. P. CUNNINGHAM, Proprietor.)
13, Arcadian Gardens, Wood Green, London, N. 22.
Telegrams: "Bripurimat, Wood, London."
'Phone: Palmers Green 608.

**SULPHATE OF AMMONIA** SATURATORS and all LEAD and TIMBER WORK in connection with Sulphate Plants.
We Guarantee promptness with efficiency for Repairs.
Joseph Taylor (Saturators), Ltd., Chemical Plant Engineers, Blackhorse Street Mills, Bolton.
Telegrams—"Saturators, Bolton." Telephone 0848.

**SPENCER'S Patent Inclined HURDLE GRIDS.**

**THE very best Patent Grids for Holding** Oxide Lightly.
See Illustrated Advertisement, Feb. 23, p. 498.

**BRITISH LUX.** AN EXCELLENT PURIFYING MATERIAL.
Features;—
(a) Porosity equal to Best Bog Ore.
(b) Contains Ferric Hydrate in an active state, thus resembling "Lux."
(c) Prepared in good mechanical condition ready for Purifiers.
Daniel Macfie, 1, North St. Andrew Street, Edinburgh.

## APPOINTMENTS, &c., VACANT.

**WHEN Filling Vacancies, please** REMEMBER THE CLAIM OF THE EX-SERVICE MAN, who, other Qualifications being equal, has the FIRST CALL ON YOUR CONSIDERATION.

**COMPETENT Statistical and Deputy** CHIEF CLERK required for a large Gas Company on the South Coast. Experienced in preparing Statistics relating to Coal, Gas, and Residual Products, together with Cost-Sheets and Records; also Correspondence relating to the various matters referred to above. Commencing Salary (minimum) £312 per Annum, including War Bonus.
Apply, by letter, with *copies* of Testimonials, to No. 7019, care of Mr. King, 11, Bolt Court, Fleet Street, E.C. 4.

## NATIONAL ASSOCIATION OF TECHNICAL GAS OFFICIALS.

Head Office:—Temple Courts,
55, Temple Row,
BIRMINGHAM.

Full particulars for membership, &c., can be obtained from the General Secretary.

## PLANT, &c., FOR SALE & WANTED.

**GAS ENGINEERS AND MANAGERS.**

**LIST of Modern Gas Plant just issued.** Copy willingly sent on application.
This comprises Retort Mountings, Condensers, Washers, Scrubbers, Purifiers, Gasholders, Exhausters, and Sundries. Complete Installations, Renewals, and Extensions.
It will pay you to ask us to quote.
Firth Blakeley, Sons, and Co., Ltd., Church Fenton, *via* Leeds.

**ADVERTISER Invites Offers for about** 250 ft. "DE BROUWER" COKE CONVEYOR CHAIN, 1 ft. 8 in. Centres, Flat Section Cast Steel Crossbar.
Address No. 7020, care of Mr. King, 11, Bolt Court, Fleet Street, E.C. 4.

**FIFTEEN 10-Ton New Specification** RAILWAY COAL WAGONS; also Five 12-Ton Side and End Doors of Modern Build, just coming out of Gas-Works Traffic, FOR SALE at a Low Price to Clear. Can be Inspected at Cardiff.
Full Particulars on application to The Cambrian Wagon Company, Ltd., East Moors Road, Cardiff.

**FOR SALE — Two 12-Ton Capacity** Rectangular Tar TANK-WAGONS, built by Roberts in 1914. Modern Specifications and Starred for Fast Main Line Traffic.
Offers wanted for one or both, No. 7025, care of Mr. King, 11, Bolt Court, Fleet Street, E.C. 4.

**FOR SALE — Sulphate of Ammonia** PLANT, STEAM-ENGINES, and Belt-Driven EXHAUSTERS—being replaced by larger plant.
Apply to W. J. Rendell Baker, Engineer and Manager, Gas-Works, Devizes.

**STATION-METER.**

**ONE 100,000 c.ft. per hour Rectangular** STATION-METER FOR SALE (by Laidlaw & Sons, Edinburgh).
For further Particulars, apply to the Engineer, Gas-Works, Greenock.

**SILSDEN URBAN DISTRICT COUNCIL.**
(Gas Department.)

FOR SALE.

**THE above Council invite Tenders for** the Purchase of:—
(1)—One CORNISH BOILER, 4 ft. dia. by 10 ft. long, constructed in 1904 by Messrs. Clayton, Son, and Co., Ltd.
(2)—One Waller Three-Blade EXHAUSTER. Capacity 5000 c.ft. per hour at 120 revs. per minute. Overhauled and Tested at maker's works. Also Screw-Down VALVES for the same.
Full Particulars and Forms of Tender may be had on Application to the undersigned.
M. Driver.
Gas-Works,
Silsden.

**FOR Sale.— First-Class Second-Hand** Double-Lift GASHOLDER of 170,000 c.ft. capacity, with NEW STEEL TANK, at Reasonable Price. Could have completed at end of July.
Firth Blakeley, Ltd., Church Fenton.

**WANTED—One or Two Second-Hand** LANCASHIRE BOILERS, 6 ft. 6 in. diam. by 24 ft. long, 100 lbs. working pressure. Must pass Insurance Inspection.
Quote Price and Particulars to No. 7026, care of Mr. King, 11, Bolt Court, Fleet Street, E.C. 4.

**WANTED—A Small (Second-Hand)** SULPHATE PLANT, Complete, in Good Working Condition.
Particulars and Prices to the Engineer, Gas-Works, Horsham.

## CONTRACTS OPEN.

**TENDER FOR COALS.**

TO COLLIERIES AND COAL FACTORS.

**THE Tottenham District Light, Heat,** and Power Company require to make CONTRACTS for a total of 150,000 Tons of Best Quality South Yorkshire or Derbyshire GAS COALS for Delivery over Twelve Months from April, 1921, to March, 1922, or proportionately less for shorter periods.
Quotations to include delivery over the Company's Weighbridge at Gas Sidings, Angel Road, G.E.R.
Tenders must state quantity offered, rate of delivery —*i.e.*, equal Monthly Delivery or 60 p.ct. during the Six Winter Months and 40 p.ct. during the Six Summer Months—and must Describe the Pit and Seam from which the Coal will be drawn.
Alternative Prices may be quoted for Three, Six, or Twelve Months Contract; and the additional charge for Delivery to Gas Sidings, Ponders End, G.E.R., is to be stated.
Prices quoted are to be dissected into (*a*) Coal, (*b*) Railway Freight, and (*c*) Wagon Hire.
Tenders must be posted not later than Friday, the 11th of March, 1921, and must be endorsed on the cover "Tender for Coal" and addressed to A. E. Broadberry, Gas Offices, 639, High Road, Tottenham, London, N. 17.

**CHELMSFORD CORPORATION.**
(Gas Department.)

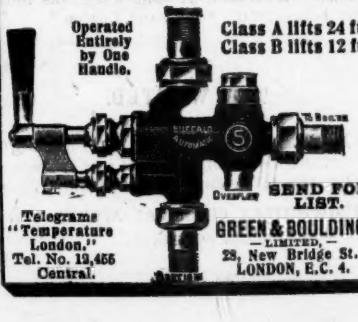
**THE Chelmsford Corporation invite** TENDERS for the Supply of Several Hundred Yards of 8-in. and 10-in. WELDLESS STEEL TUBES.
Particulars on Application to Mr. Er. W. Smith, Gas Engineer, Gas-Works, Chelmsford.
Tenders to be delivered to the undersigned by not later than the 21st of March, 1921.
Reg. C. Knight,
Town Clerk.
Municipal Offices,
Chelmsford,
March 1, 1921.

*JUST PUBLISHED.* In 2 volumes (sold separately). 3rd Edition, enlarged. Demy 8vo. Cloth. With numerous Illustrations and folding Plates.
Each Volume, 10s. 6d. net.

**MODERN COKING PRACTICE**
By J. E. CHRISTOPHER.
Including the ANALYSIS OF RAW MATERIALS AND PRODUCTS
By T. H. BYROM.
Vol. I—RAW MATERIALS AND COKE.
Vol. II—BY-PRODUCTS.

**Crosby Lockwood & Son,**
7, Stationers' Hall Court, London, E.C.

**CARBURINE & BENZOL FOR GAS ENRICHING**
ALSO
THE MAXIM PATENT CARBURETTOR.
For Prices, &c., apply to
The GAS LIGHTING IMPROVEMENT CO., Ltd.
ALEXANDRA HOUSE, QUEEN SQUARE,
LONDON, W.C. 1.
Telephones: Museum 7400, 7401, 7402, 7403, 7404.
Telegraphic Address: "Carburine, London."

**'BUFFALO' INJECTOR**
Operated Entirely by One Handle.
Class A lifts 24 ft.
Class B lifts 12 ft.

SEND FOR LIST.
Telegrams "Temperature London." Tel. No. 19,455 Central.
GREEN & BOULDING, — LIMITED, — 28, New Bridge St., LONDON, E.C. 4.